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NATIONAL DAM SAFETY PROGRAM. LAKE PLACID VILLAGE DAM. (INVENTOR--ETC(U)
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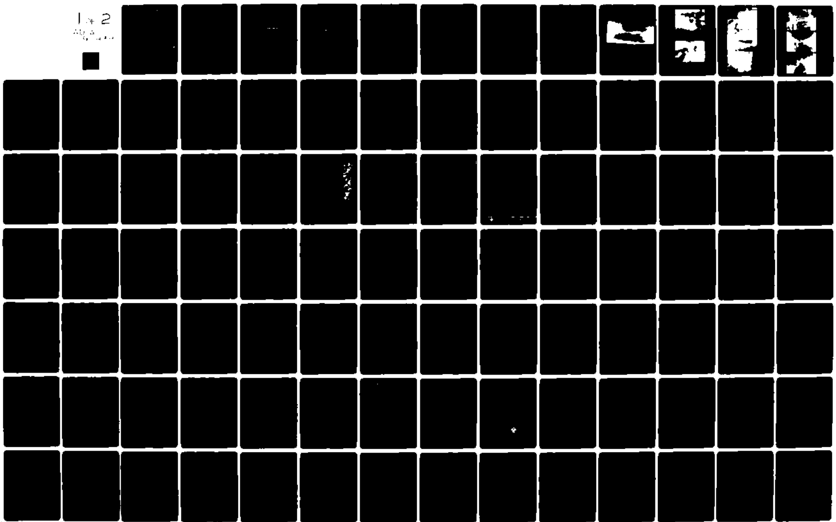

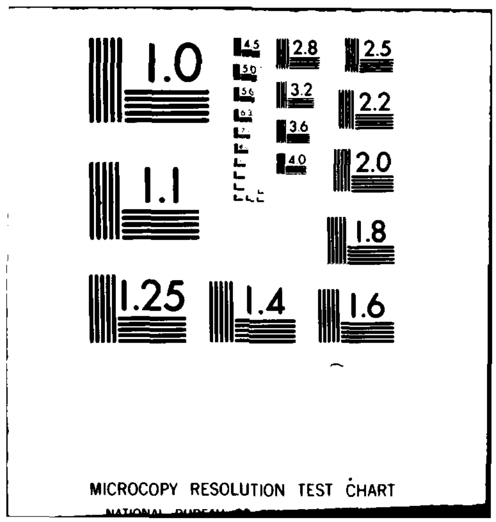
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Lake Placid Village Dam
Essex County
Chubb River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

The examination of documents and visual inspection of the dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property. The dam, however, has a number of problem areas which require further investigation and remedial work.

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The structural stability analysis indicates that the dam is unstable when subjected to forces which could occur under the Probable Maximum Flood (PMF) loading condition. Unsatisfactory stability is indicated for the dam when subject to forces which could occur during the normal winter operations and the 1/2 PMF loading condition.

A structural stability investigation should be started within six months to determine the characteristics of the uplift forces acting on the dam and to determine whether the foundation acts integrally with the dam section to resist overturning. Remedial work should be completed, depending on the results of the investigation, within two years.

The hydrologic/hydraulic analysis establishes the spillway capacity as 10.7% of the Probable Maximum Flood (PMF). The dam will be overtopped by 10.0 feet and 4.8 feet during the PMF and 1/2 PMF respectively. The spillway is inadequate since failure of the dam during the 1/2 PMF event will not significantly increase the downstream hazard from that which would occur just prior to the dam failure.

The following measures should be undertaken within one year:

1. Repairs to restore the dam's deteriorated concrete on the spillway and both abutments should be undertaken.

2. The channel wall at the toe of the south abutment should be repaired to prevent further deterioration of the bank of the stream and protect the south abutment from erosion.

3. A flood warning and evacuation plan should be developed and implemented to alert the public, should conditions occur which could result in failure of the dam.

4. A formalized inspection program should be initiated to develop data on conditions and maintenance operations at the facility.

LAKE CHAMPLAIN RIVER BASIN,

6 National Dam Safety Program.

LAKE PLACID VILLAGE DAM

(Inventory Number NY 781),

ESSEX COUNTY,

NEW YORK.

[redacted]

PHASE I INSPECTION REPORT,

NATIONAL DAM SAFETY PROGRAM

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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FIGURES

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PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam Lake Placid Village Dam, NY781

State Located New York
County Located Essex
Stream Chubb River
Date of Inspection April 22, 1980

ASSESSMENT OF GENERAL CONDITIONS

The examination of documents and visual inspection of the dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property. The dam, however, has a number of problem areas which require further investigation and remedial work.

The structural stability analysis indicates that the dam is unstable when subjected to forces which could occur under the Probable Maximum Flood (PMF) loading condition. Unsatisfactory stability is indicated for the dam when subject to forces which could occur during the normal winter operations and the 1/2 PMF loading condition.

A structural stability investigation should be started within six months to determine the characteristics of the uplift forces acting on the dam and to determine whether the foundation acts integrally with the dam section to resist overturning. Remedial work should be completed, depending on the results of the investigation, within two years.

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3. A flood warning and evacuation plan should be developed and implemented to alert the public, should conditions occur which could result in failure of the dam.

4. A formalized inspection program should be initiated to develop data on conditions and maintenance operations at the facility.

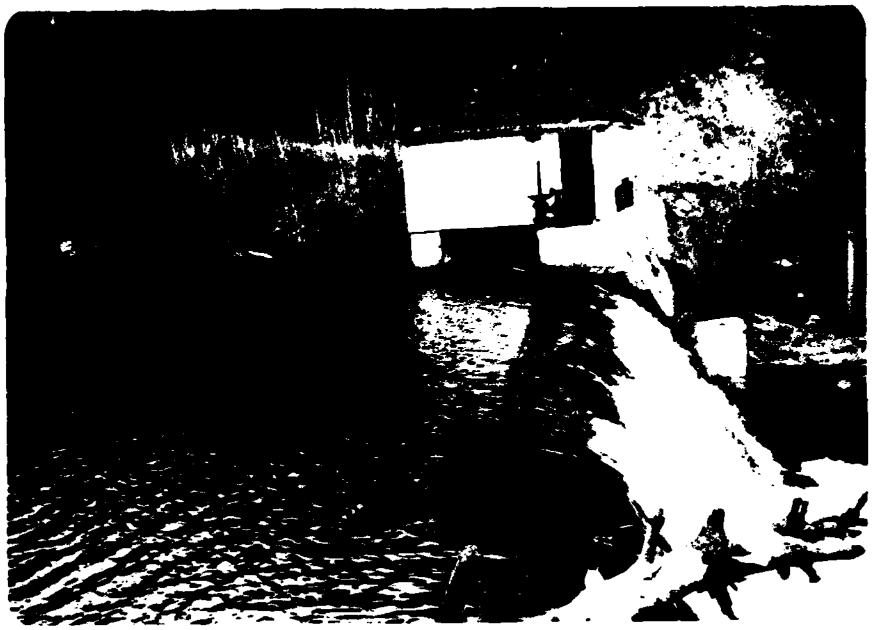
Dale Engineering Company

John B. Stetson, President

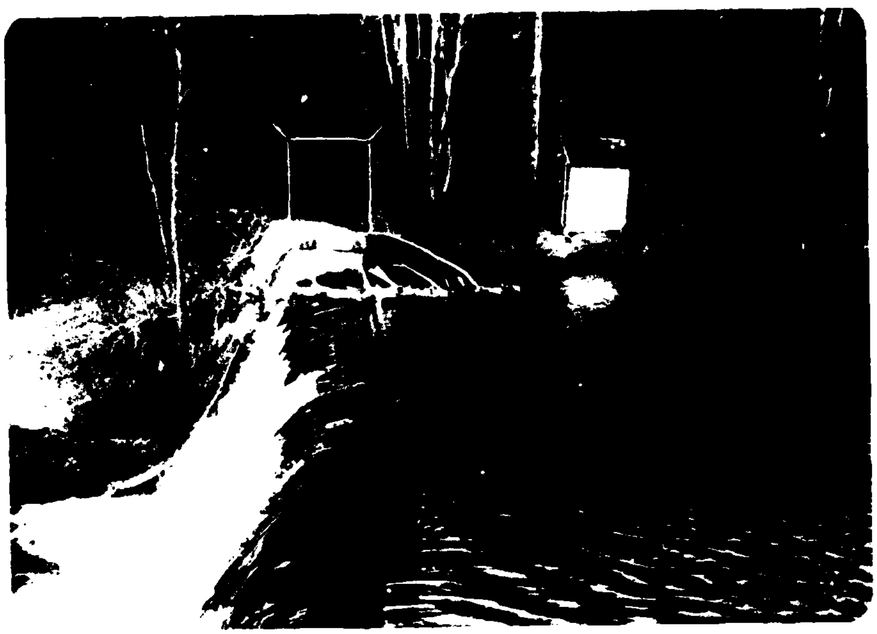
Approved By:
Date: 16 Sep 80

Col. W.M. Smith Jr.
New York District Engineer

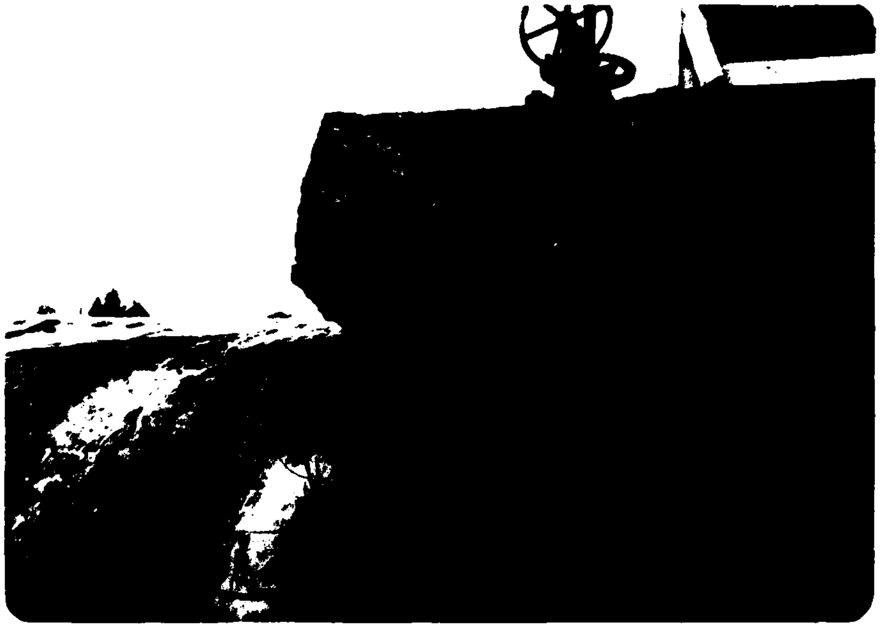
1. Overview of Lake Placid Village Dam NY 781. Note deterioration of face of spillway as evidenced by irregular pattern of flow.



2. View from southwest abutment.

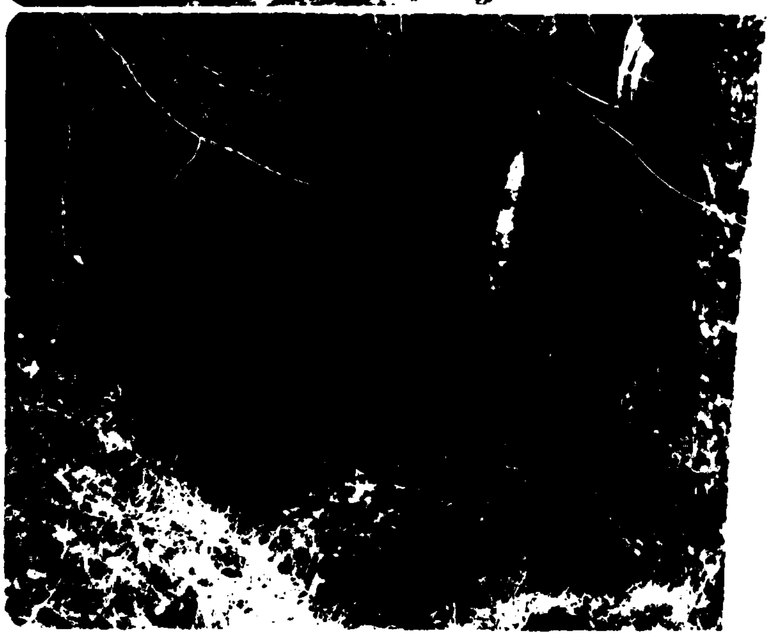


3. View from northeast abutment.
Note deterioration at crest of spillway.



4. Deterioration of northeast abutment viewed from below the dam.

5. Deterioration of masonry wall at toe of dam.



6. Close-up of 5 above.

7. Operating mechanism for sluice gate controlling flow to penstock.

8. Downstream channel viewed from Dam. Note building 800 feet downstream.

9. Downstream channel showing downstream hazard, electric substation and municipal power building.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM - LAKE PLACID VILLAGE DAM ID# - NY 781

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Authority for this report is provided by the National Dam Inspection Act, Public Law 92-367 of 1972. It has been prepared in accordance with a contract for professional services between Dale Engineering Company and The New York State Department of Environmental Conservation.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the existing condition of the Lake Placid Village Dam and appurtenant structures, owned by the Village of Lake Placid, New York, and to determine if the dam constitutes a hazard to human life or property and to transmit findings to the State of New York.

This Phase I inspection report does not relieve an Owner or Operator of a dam of the legal duties, obligations or liabilities associated with the ownership or operation of the dam. In addition, due to the limited scope of services for these Phase I investigations, the investigators had to rely upon the data furnished to them. Therefore, this investigation is limited to visual inspection, review of data prepared by others, and simplified hydrologic, hydraulic and structural stability evaluations where appropriate. The investigators do not assume responsibility for defects or deficiencies in the dam or in the data provided.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The Lake Placid Village Dam is located on the Chubb River in the Village of Lake Placid, approximately 4/10 of a mile downstream from the Route 73 bridge across the Chubb River. The dam is a concrete gravity structure approximately 19 feet high and 136 feet long with a 70 foot wide ogee crested spillway centered in the structure. The dam is slightly curved with a radius of approximately 300 feet. The northeast abutment of the dam accommodates a wood frame control structure which houses the controls for a sluice gate which regulates flow into a 5 foot, 4 inch diameter penstock which formerly transmitted flow to a power generating station located approximately 800 feet downstream. The gate mechanism for a 36 inch diameter drain and waste pipe is also located on the west abutment. Borings located near both the northeast and the southwest abutments indicate that the

dam is founded on silt, sand and gravel rather than on rock. Plans for the repair of the dam in 1936 indicate that the dam foundation of concrete was extended approximately 12 feet below the original base of the dam into the sand and gravel material.

b. <u>Location</u>

The Lake Placid Village Dam is located in the Village of Lake Placid, Town of North Elba, Essex County, New York.

c. <u>Size Classification</u>

The maximum height of the dam is approximately 19 feet. The storage volume of the impoundment is approximately 70 acre feet. Therefore, the dam is in the Small Size Classification as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. <u>Hazard Classification</u>

The Chubb River, the receiving stream from the impoundment, flows immediately adjacent to a storage building and electric substation which is owned and operated by the Village of Lake Placid Municipal Electric Department. This facility is located approximately 800 feet downstream from the dam. Therefore, the dam is in the High Hazard Category as defined by the Recommended Guidelines for Safety Inspection of Dams.

e. <u>Ownership</u>

The dam is owned by the Village of Lake Placid, New York.

Contact: Village of Lake Placid
Eileen Valentine, Village Clerk
Lake Placid, New York 12946
Telephone: 518-523-2597 Village Clerk
518-523-2021 Municipal Electric Department

f. <u>Purpose of the Dam</u>

The dam is presently used to maintain a pond within the Village of Lake Placid for recreational, aesthetic and environmental purposes. The dam was formerly used as a source of water for hydroelectric power generation. A hydroelectric feasibility study of this site was completed in 1979. This study explored the feasibility of re-equipping the site for hydroelectric power generation. At present, no steps have been taken to re-equip the site for power generation.

g. <u>Design and Construction History</u>

The construction plans included in this report indicate that the dam was reconstructed in 1936. The reconstruction was necessary to repair damage caused by a failure of the dam foundation under high

water early in the summer of 1936. The application for the reconstruction of the dam to New York State Department of Public Works states "The high early water in the summer forced a channel through underneath the structure and now the dam is undermined for nearly the entire length and remains suspended by the wing walls. The wing walls apparently have a good bearing and have shown no indication of failure." The application further states "the superstructure of the present dam will remain unchanged as it stood for 30 years. The reconstruction will consist only of carrying the concrete down to a solid impervious foundation." An earlier conservation commission dam report dated July 23, 1919 covers a dam which is called Power House Dam on the Chubb River. Sketches in this report indicate the total length of dam to be approximately 80 feet with a 40 foot spillway and a height of 15 feet above the stream bed. Earlier correspondence in 1913 discusses the quality of the concrete in a dam under construction by the Village of Lake Placid. This dam is referred to as Number 599 which is the same number referred to in the dam report of 1919. No records have been found to indicate a modification of the 1919 dam to the configuration shown on the 1936 plans.

h. Normal Operational Procedures

The facility is operated by the Village of Lake Placid Municipal Electric Department. At the present time, the dam has been abandoned for power generating purposes but the impoundment is maintained for recreational, aesthetic and environmental purposes.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area of the Lake Placid Village Dam is 38.3 square miles.

b. Discharge at Dam Site

No discharge records are available for this site.

Computed Discharges:

Ungated Spillway, Top of Dam	2212 cfs
Reservoir Drain Capacity (Water Surface at Normal Pool)	175 cfs

c. Elevation (Feet Above MSL)

Top of Dam	1710
Spillway Crest	1706
Stream Bed at Centerline of Dam	1691

d. Reservoir

Length of Normal Pool 1150± FT

e. Storage

Top of Dam	102 Acre Feet
Normal Pool	70 Acre Feet

f. Reservoir Area

Top of Dam	9 Acres
Spillway Pool	7 Acres

g. Dam

Type - Concrete Gravity.
Length - 136 Feet.
Height - 19 Feet.
Freeboard Between Normal Reservoir and Top of Dam - 4 Feet.
Top Width - 6 Feet.
Side Slopes - Upstream - Vertical; Downstream - 6 Horizontal, 12 Vertical.
Zoning - N/A.
Impervious Core - N/A.
Grout Curtain - Unknown.

h. Spillway

Type - Ogee Crest.
Length - 70 Feet.
Crest Elevation - 1706.
Gates - None.
U/S Channel - Impoundment.
D/S Channel - Natural Stream Channel.

i. Regulating Outlets

1. Wooden sluice gate controls outlet to 5 feet, 4 inch diameter penstock, gate dimensions unknown.
2. Sluice gate controls outlet through 36 inch diameter drain and waste pipe.

SECTION 2 - ENGINEERING DATA

2.1 GEOTECHNICAL DATA

The 1936 application for the reconstruction of the dam makes reference to the foundation material as consisting of "hardpan and boulders." No other data on subsurface investigations was available. A hydroelectric feasibility study, performed for the Village of Lake Placid in 1979, provided two soil borings taken near the dam abutments. These soil borings are included in Appendix B.

2.2 DESIGN RECORDS

No records were available from the original design of the dam. Drawings for the reconstruction of the dam in 1936 are included as Figures 2 and 3. The permit application for reconstruction of the dam is also included in Appendix B.

2.3 CONSTRUCTION RECORDS

No information was available concerning either the original construction or the reconstruction of the dam.

2.4 OPERATION RECORDS

There were no operation records available for this dam.

2.5 EVALUATION OF DATA

The data presented in this report was obtained from the Department of Environmental Conservation files. The information available appears to be reliable and adequate for a Phase I Inspection Report.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

The Lake Placid Village Dam was inspected on April 22, 1980. The Dale Engineering Company Inspection Team was accompanied on the inspection by James VonDell, Assistant Superintendent of Electric for the Village of Lake Placid.

b. Dam

At the time of the inspection, water was cresting the spillway at a depth of 5 inches. This flow obscured from view the surface of the spillway; however, the irregular pattern of the flow across the crest of the spillway indicates that surface deterioration has taken place on the face of the spillway. The northeast abutment of the spillway is severely deteriorated and partially undercut at the water surface. A similar condition exists, although to a somewhat lesser degree, on the southwest abutment. Visual observation did not disclose physical displacement of the alignment of this structure and despite the severe deterioration of the spillway abutments, the facility shows no visual signs of instability.

c. Appurtenant Structures

The northeast abutment accommodates the intake to the penstock which formerly fed the downstream power generating station. Although the house which encloses the sluice gate controls is somewhat deteriorated, the penstock inlet appears to be generally in good condition.

d. Control Outlet

The outlet of the impoundment is controlled by the gates at the penstock and the drain line to the impoundment. These gates are in operating condition and the gate at the impoundment drain was partially open during the inspection.

e. Reservoir Area

The reservoir extends approximately 1150 feet upstream and provides a pond which is used for recreational, aesthetic and environmental purposes. There is no evidence of bank instability in the impoundment area.

f. Downstream Channel

The downstream channel is formed by masonry walls which extend downstream to the former generating station, approximately 800 feet downstream. The masonry wall at the toe of the dam near the southwest

abutment is severely deteriorated and erosion is now occurring at the toe of the abutment. The debris from the wall is now lying in the creek bed. Tree root penetration is occurring in the abutment core wall which is exposed at this location. Other than this spot, the masonry channel walls appear to be in good condition.

3.2 EVALUATION

The visual inspection revealed some deterioration of the spillway surface and rather severe undercutting of the spillway abutment walls near the crest elevation. The channel wall near the southwest abutment should be repaired to prevent further erosion at the abutment. No deformation of the alignment of any of the structures which would indicate instability was noted in the visual inspection.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The normal operating procedure for this structure is to control the water level in the impoundment for recreational, aesthetic and environmental purposes. This level is maintained without manipulation of the gates controlling the outlet from the impoundment.

4.2 MAINTENANCE OF THE DAM

Maintenance and operation of the dam is controlled by the Village of Lake Placid Municipal Electrical Department. Periodic visits are made to the site to check on conditions of the facilities. No formal reporting system is in effect.

4.3 MAINTENANCE OF OPERATING FACILITIES

The gates controlling the flow are presently in operating condition and are checked periodically by the Municipal Electric Department.

4.4 DESCRIPTION OF WARNING SYSTEM

No warning system is in effect at present.

4.5 EVALUATION

The dam and appurtenances are inspected at regular intervals by the Village of Lake Placid Municipal Electric Department. The facilities are in generally good working condition. There is no evidence of deterioration caused by lack of maintenance. Since the dam is in the High Hazard Classification, a warning system should be implemented to alert the public, should conditions occur which could result in failure of the dam.

SECTION 5 - HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The Lake Placid Village Dam is located in the northwest portion of Essex County. The dam has a drainage area of 38.3 square miles, which is characterized by steeply sloping terrain. The northern portion of the drainage area is dominated by Lake Placid, whereas the southern portion contributes to the Chubb River. The reservoir has a surface area of approximately 7 acres and is situated on the Chubb River approximately 2 miles upstream of its confluence with the West Branch of the Ausable River.

5.2 ANALYSIS CRITERIA

The purpose of this investigation is to evaluate the dam and spillway with respect to their flood control potential and adequacy. This has been assessed through the evaluation of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the flood through the reservoir and the dam's spillway system. The PMF event is that hypothetical flow induced by the most critical combination of precipitation, minimum infiltration loss and concentration of run-off of a specific location that is considered reasonably possible for a particular drainage area. The dam is in the Small Dam Category and is a High Hazard.

The hydrologic analysis was performed using the unit hydrograph method to develop the flood hydrograph. Due to the limited scope of this Phase I investigation, certain assumptions, based on experience and existing data were used in this analysis and in the determination of the dam's spillway capacity to pass the PMF. In the event that the dam could not pass 1/2 the Probable Maximum Flood without overtopping, additional analyses are to be performed on potential dam failures if the dam is designated as a High Hazard Classification. This process was done with the concept that if the dam was unable to satisfy this criteria, further refined hydrologic investigations would be required.

The U.S. Army Corps of Engineers' Hydrologic Engineering Center's Computer Program HEC-1 DB using the Modified Puls Method of flood routing was used to evaluate the dam, spillway capacity, and downstream hazard.

Unit hydrographs were defined by Snyder coefficients, C_t and C_p. Snyder's C_t was estimated to be 1.5 for the steeply sloped drainage area and C_p was estimated to be 0.625. The drainage area was divided into sub-areas to model the variability in hydrologic characteristics within the drainage basin. Run-off, routing and flood hydrograph combining was then performed to obtain the inflow into the reservoir.

The Probable Maximum Precipitation (PMP) was 16.2 inches according to Hydrometeorological Report (HMR #33) for a 24-hour duration storm, 200 square mile basin, while loss rates were set at 1.0 inches initial abstraction and 0.1 inches/hour continuous loss rate. The loss rate function yielded 82 percent run-off from the PMF. The peak for the PMF inflow hydrograph was 20,695 cfs and the 1/2 PMF inflow peak was 9,520 cfs. The relatively small storage capacity of the reservoir only reduced these peak flows to 20,686 cfs for the PMF, whereas the 1/2 PMF flow was essentially unchanged.

5.3 SPILLWAY CAPACITY

The spillway is an ogee-crested weir type structure 70 feet in length. Weir coefficients ranging from 3.2 to 4.15 over the heads encountered in routing the PMF were assigned for the spillway rating curve development. The discharge capacity of the spillway at the top of dam elevation is 2212 cfs.

SPILLWAY CAPACITY

Flood	Peak Discharge	Capacity as % of Flood Discharge
PMF	20,686 cfs	10.7%
1/2 PMF	9,520 cfs	23.2%

5.4 RESERVOIR CAPACITY

The reservoir storage capacity was estimated from USGS mapping. The resulting estimates of the reservoir storage capacity are shown below:

Top of Dam	100 Acre Feet
Spillway Crest	70 Acre Feet

5.5 FLOODS OF RECORD

There is no information on water levels at the dam site.

5.6 OVERTOPPING POTENTIAL

The HEC-1 DB analysis indicates that the dam will be overtopped as follows:

Flood	Maximum Depth Over Dam
PMF	10.0 Feet
1/2 PMF	4.8 Feet

A dam break analysis was performed to determine the significance of various dam failures on the downstream hazard. This analysis was performed with the 1/2 PMF assuming the dam to fail at the maximum elevation resulting from the 1/2 PMF. This condition represents the

worst case that could result from the 1/2 PMF, with regards to the flood discharges in the downstream area. The information available for the stability analysis was inadequate to determine the exact water elevation necessary to induce failure of the dam, therefore, this assumption was made for comparison purposes. The flood elevations, due to various dam failures and the flood elevations that would exist just before the corresponding dam break induced flood wave are shown below. These flood elevations are compared at the Village of Lake Placid Municipal Electric Department's offices.

	Flood Elevations @ Elec. Dept.	
	Just Prior to Dam Break	Due to Dam Break
Failure Time = 0.1 hrs.	1683.8	1684.9
Failure Time = 0.3 hrs.	1683.8	1684.9
Failure Time = 0.5 hrs.	1683.8	1684.8

The above elevations were estimated from USGS quad sheets and available topographic information from previous reports. These elevations are not exact and their significance is in the difference between the elevations for the flood levels with and without the dam failure. The maximum difference determined by this analysis is only about one foot, indicating that the downstream hazard would not be increased by a dam failure under this condition. It should also be noted that the Electric Department's offices will be flooded before the dam is assumed to fail, serving to warn the occupants to evacuate the area.

5.7 EVALUATION

The hydrologic/hydraulic analysis establishes the spillway capacity as 10.7% of the Probable Maximum Flood (PMF). The dam will be overtopped by 10.0 feet under the PMF and 4.8 feet during the 1/2 PMF. However, failure of the dam during the 1/2 PMF event will not significantly increase the downstream hazard from that which would occur just prior to the dam failure. Therefore, the spillway is assessed as inadequate according to the Corps of Engineers screening criteria.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

This dam is a concrete structure having a curved alignment. Most of the dam's length is comprised of its ogee spillway section. The abutments are constructed into the glacially deposited soils natural to the site. No outcroppings of bedrock were visible in the vicinity of the dam. The downstream channel is defined by low masonry walls which presumably were constructed to prevent erosion of the natural banks along this segment of the Chubb River.

The dam was inspected under conditions where flow over the spillway was occurring, limiting the physical detail visible for evaluation. The abutment sections were visible, however. The field observations indicate the dam retains structural stability but surface deterioration including at least surficial cracking and/or jointing is evident. Noticeable erosion (loss-of-section) has occurred at the northerly abutment (left abutment facing downstream). There is a general surface deterioration occurring in the concrete for this abutment section. The southerly abutment (right abutment) also shows some loss-of-section near the toe of the spillway, with a general surface deterioration throughout. The section of masonry forming the southerly channel wall immediately downstream of the abutment has been destroyed by erosion but the remaining sections of downstream walls appear to be in satisfactory structural condition.

Soil conditions at the toe of the dam were not visible, and the possibility of erosion, undermining and seepage in that area could not be investigated. No indications of seepage around the abutment sections were noted. In the gatehouse located on the left abutment, the control for a waste tube appeared to be open slightly, and some flow was outletting at the discharge point near the toe of the abutment/spillway. It could not be ascertained if some of the observed flow was leakage but the discharge did appear to be all pipe flow.

b. Geology and Seismic Stability

Geologically, Lake Placid is located within the Adirondack Province. The dam and the abutments are sited in glacial drift. According to Miller and Alling (Ref. 17) glacial till was deposited on top of glacial lacustrine deposits. Their information indicates till along Chubb River in the vicinity of the dam site. An exposure of well-sorted sands with some gravel was observed along the roadway extending along the northerly side of Chubb River immediately downstream of the dam. The September 28, 1936, State Engineering Report indicates the dam bed as being "impervious, nonwaterbearing." However, if the foundation and banks are sands and gravels of a lacustrine nature,

it is expected they are permeable. Two borings drilled in 1978, one located a short distance from the dam's northerly abutment and the other sited near the southerly abutment, encountered mainly sands with some gravel. Mostly moist silt was encountered at the lower depths of the northerly boring. The borings did not contact bedrock.

With reference to soil conditions indicated by the 1978 borings, potential for leakage beneath or around the dam exists due to the type of material.

Bedrock in the vicinity of the dam is believed to be of Precambrian metasedimentary rock, probably gneissic. This bedrock probably is too deep to benefit the water-impounding-function of the dam.

Faults are common in this area as shown on Figure 4, Geologic Map. Several nearly vertical faults are present in the small quarry at the southern end of Lake Placid (Ref. 16). The Seismic Probablility Map locates the dam near the border of a Zone 2 - Zone 3 Designation. The major earthquakes occurring in this region are listed in the following table; numerous minor earthquakes have also occurred. It is felt the area has potential for an earthquake of intensity VI-VII (MM scale).

Date	Intensity Modified Mercalli	Location Relative to Dam
1877	VII	15 mi. N
1910	III	10 mi. WNW
1926	IV	7 mi. NW
1932a	IV	11 mi. NW
1932b	III	11 mi. NW
1948	III	9 mi. SE
1974a	III	10 mi. N
1974b	III-IV	16 mi. N
1974c	IV	4 mi. N
1977	V-VI	8 mi. NNE
1978	IV-V	17 mi. NE
1979	V-VI	12 mi. NE

c. Stability Evaulation

Design drawings available for review show plan alignment and the cross-section from the dam spillway but do not include information on the properties of the dam and foundation materials, nor stability analysis. As part of the present study, stability evaluations have been performed for the dam spillway section. Actual properties of the dam's construction materials and foundations were not determined as part of this study; where information on properties were necessary for computations but lacking, assumptions felt to be practical were made. The stability computations assumed a structural cross-section

based on dimensions indicated by the plans included in this report. It should be considered that in areas where deterioration has occurred, section dimensions would be less than indicated by the plans, with some adverse affect on the structural strength expected. The studies also assumed dam sections analyzed to be monoliths possessing necessary internal resistance to shear and bending occurring as a result of loading.

Information obtained for this study indicates the original dam structure was provided with a poured concrete underpinning foundation section circa 1936. Reportedly, the original dam's soil foundation virtually washed away during the Winter-Spring of 1936 after test pit excavations made along the toe of the dam in Fall of 1935 were abandoned without backfilling. Information on the as-built foundation section or reports of its construction are not available, but information on the design of the new foundation is shown on the dam cross-section included with this report. Consequently, for the stability studies for this report, two cross-sections were assumed: (a) the original structure and the foundation section act as a integral unit and, (b) an unbonded construction joint presently exists between the original dam structure and the underpinning foundation, with the effect that the original section is essentially an independent structure.

The results of the stability computations are summarized in the table following this page. The stability analysis are presented in Appendix D.

The engineering studies indicate satisfactory stability against overturning and sliding affects for the dam subject to forces possible during normal summer type operation (no ice loading). A marginally safe factor of safety is indicated for the structure subject to seismic forces if the dam with its new foundation acts integrally, but a sliding failure is possible if the original dam section is not structurally tied to the foundation. The analysis indicates unsatisfactory stability against overturning for the two dam sections analyzed when subject to forces including ice loading possible during normal winter operations, according to the Recommended Guidelines for Safety Inspection of Dams (i.e., where the resultant of forces acting on the dam is located outside the middle third of the base, tensile stresses would develop in the dam section, a condition which is structurally undesirable.)

Unsatisfactory stability is indicated for both analyzed spillway sections when subjected to the 1/2 PMF loading condition. Instability is indicated for both spillway sections analyzed when subject to the PMF loading condition.

RESULTS OF STABILITY COMPUTATIONS

	Loading Condition	Factor of Safety* Overturning	Factor of Safety* Sliding**	Location of Resultant*** Passing through Base
(1)	Water level at spillway elevation, uplift on base of section (no ice)			
	(a) Presently existing section (including 1936 foundation section)	1.52	1.67	0.40b
	(b) Upper (original) section only, assuming no bond between base of original section and 1936 foundation section	1.84	1.24	0.53b
(2)	Water level at spillway elevation, uplift on base of section plus 10 kip per lineal foot ice load acting			
	(a) Presently existing section (including 1936 foundation section)	1.06	1.3	0.07b
	(b) Upper (original) section only, assuming no bond between base of original section and 1936 foundation section	1.10	0.65	0.11b
(3)	Water elevations at 1/2 PMF levels, uplift on base of section			
	(a) Presently existing section (including 1936 foundation section)	1.08	1.18	0.13b
	(b) Upper (original) section only, assuming no bond between base of original section and 1936 foundation section	1.07	0.50	0.16b

RESULTS OF STABILITY COMPUTATIONS - (CONTINUED)

	Loading Condition	Factor of Safety* Overturning	Sliding**	Location of Resultant*** Passing through Base
(4)	Water elevations at PMF level, uplift on base of section			
	(a) Presently existing section (including 1936 foundation section)	0.97	1.04±	Outside of base (FS<1)
	(b) Upper (original) section only, assuming no bond between base of original section and 1936 foundation section	0.90	0.4±	Outside of base (FS<1)
(5)	Reservoir level at spillway elevation, uplift on base, seismic effect applicable to Zone 3			
	(a) Presently existing section (including 1936 foundation section)	1.24	1.28	0.25b
	(b) Upper (original) section only, assuming no bond between base of original section and 1936 foundation section	1.50	0.8±	0.43b

* These factors of safety indicate the ratio of moments resisting overturning to those causing, and the ratio of forces resisting sliding to those causing.
** Assuming friction only, no shear/bond developing on base of section being analyzed.
*** Indicated in terms of the dam's base dimension, b, measured from the toe of the dam.

Critical to the analysis for cases indicating instability is the item of uplift water pressures acting on the base of the dam section for each case analyzed, the uplift force was based on a full headwater hydrostatic pressure acting on the dam's upstream corner and a full tail water hydrostatic pressure acting at the dam's downstream corner. Uplift pressures were assumed to vary linearly between the dam's upstream and downstream corners, and act upon 100 percent of the dam section's base.

For the 1/2 PMF and PMF condition, it was assumed that lateral pressures acting on the back and front faces of the dam correspond to the upstream and downstream flood levels respectively. Stability is expected for the dam sections when complete submergence under a static water level condition occurs (e.g., a difference in reservoir and downstream water levels does not occur in the vicinity of the structure.)

Further study to investigate the actual construction and condition of the dam including the underpinning foundation, the properties of the foundation soils, and the effect on the dams structural stability is recommended. If analysis performed on the basis of actual conditions found to exist indicates structural instability, the study should develop methods for protecting the facility. Maintenance required at this time, to retain the existing stability, includes patching and repair to damaged surface areas of the abutments and spillway, and rebuilding of the channel wall below the toe of the southerly abutment.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety

The Phase I inspection of the Lake Placid Village Dam did not indicate conditions which would constitute an immediate hazard to human life or property.

The hydrologic/hydraulic analysis indicates that the spillway will pass only 10.7% of the Probable Maximum Flood (PMF). The dam will be overtopped by 10.0 feet and 4.8 feet by the PMF and 1/2 PMF respectively. However, since failure of the structure during a 1/2 PMF event would not cause appreciably more danger to downstream inhabitants than would exist during the 1/2 PMF just prior to a dam break, the spillway is assessed as inadequate.

The following specific safety assessments are based on the Phase 1 Visual Examination and Analysis of Hydrology and Hydraulics and Structural Stability.

1. Visual observations indicate that some surficial cracking and jointing is evident in the spillway. Noticeable erosion has occurred at the northerly abutment and there is general surface deterioration of the concrete in this area.

2. The southerly abutment also shows some loss of section near the toe of the spillway with general surface deterioration throughout.

3. The section of masonry forming the southerly channel wall immediately downstream from the abutment has been destroyed by erosion and tree root intrusion is occurring in the core wall which is exposed in this area.

4. The stability analysis indicates satisfactory stability exists during normal summer type operation. A marginally safe factor of safety is indicated for the structure subject to seismic forces. The analysis indicates unsatisfactory stability for the dam sections analyzed when subject to forces including ice loading possible during normal winter operations and the 1/2 PMF loading condition. Instability is indicated for both analyzed sections under the PMF loading condition.

5. No warning system is presently in effect to alert the public, should conditions occur which could result in failure of the dam.

b. Adequacy of Information

The information available is adequate for this Phase 1 investigation.

c. Urgency

Items 1 through 5 in the safety assessment should be dealt with and appropriate improvements and repairs should be performed within one year of this notification.

d. Need for Additional Investigation

Further investigations relative to the stability of the dam should be performed to determine appropriate remedial measures.

7.2 RECOMMENDED MEASURES

The following is a list of recommended measures to be undertaken to insure safety of the facility:

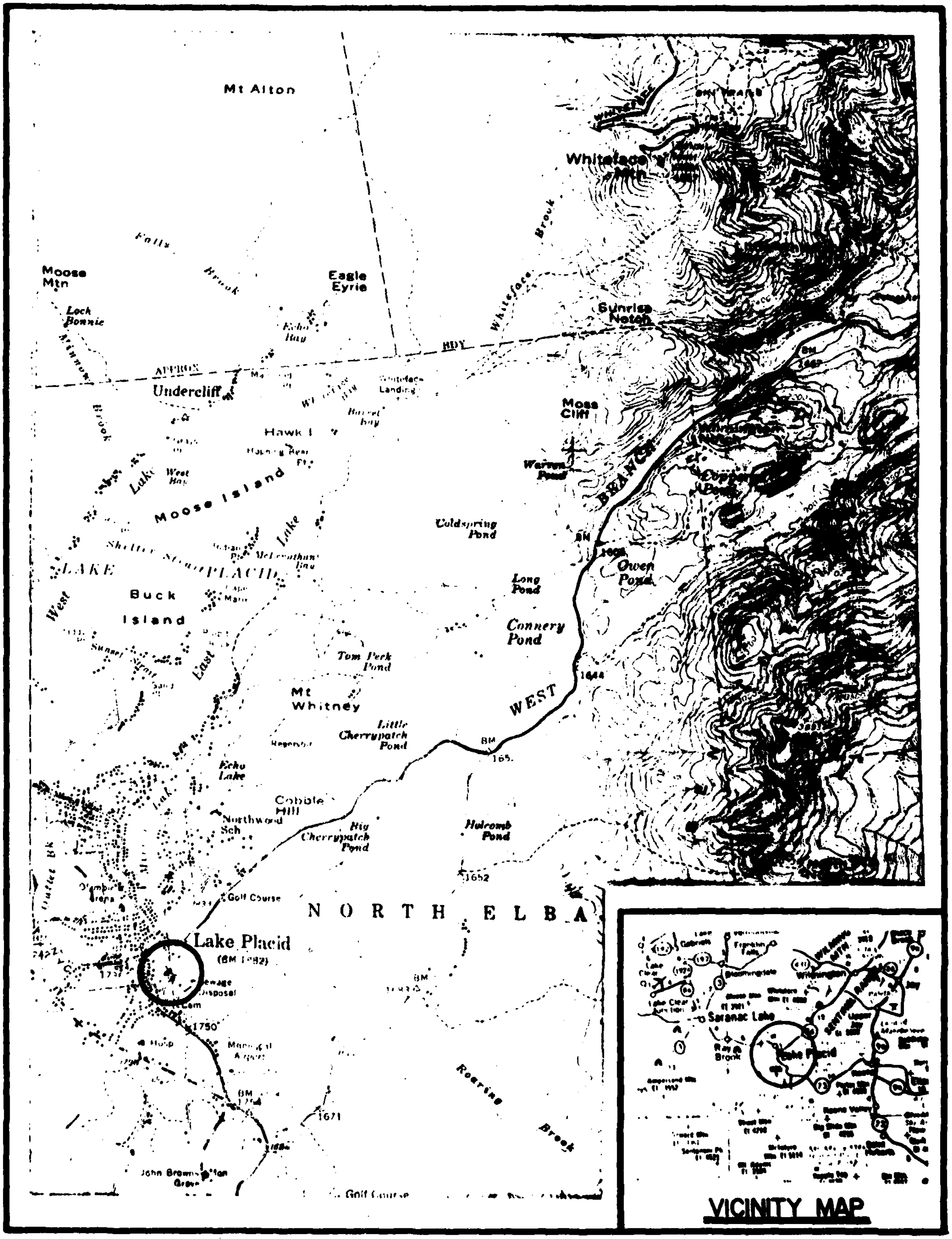
1. Further study to investigate the actual construction and condition of the dam including the underpinning foundation, the properties of the foundation soils, and the effect on the dam's structural stability is recommended. If analysis performed on the basis of actual conditions found to exist indicates structural instability, the study should develop methods for protecting the facility. Remedial work should be undertaken depending on the results of the investigation.

2. Repairs to deteriorated concrete should be undertaken.

3. The channel wall at the toe of the south abutment should be repaired to prevent further deterioration of the bank of the stream in this area.

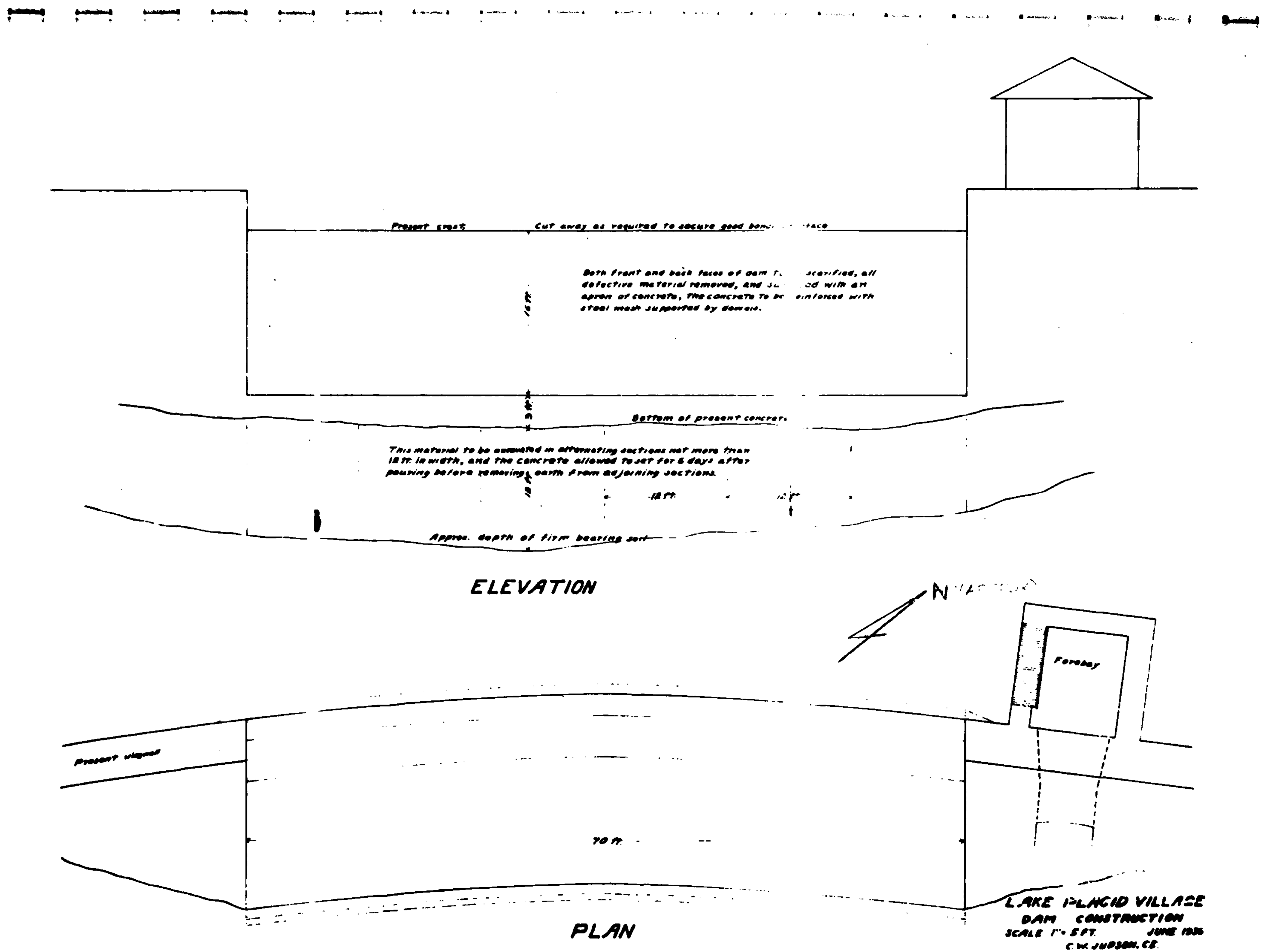
4. A flood warning and emergency evacuation plan should be developed and implemented to alert the public, should conditions occur which could result in failure of the dam.

5. A formalized inspection program should be initiated to develop data on conditions and maintenance operations at the facility.



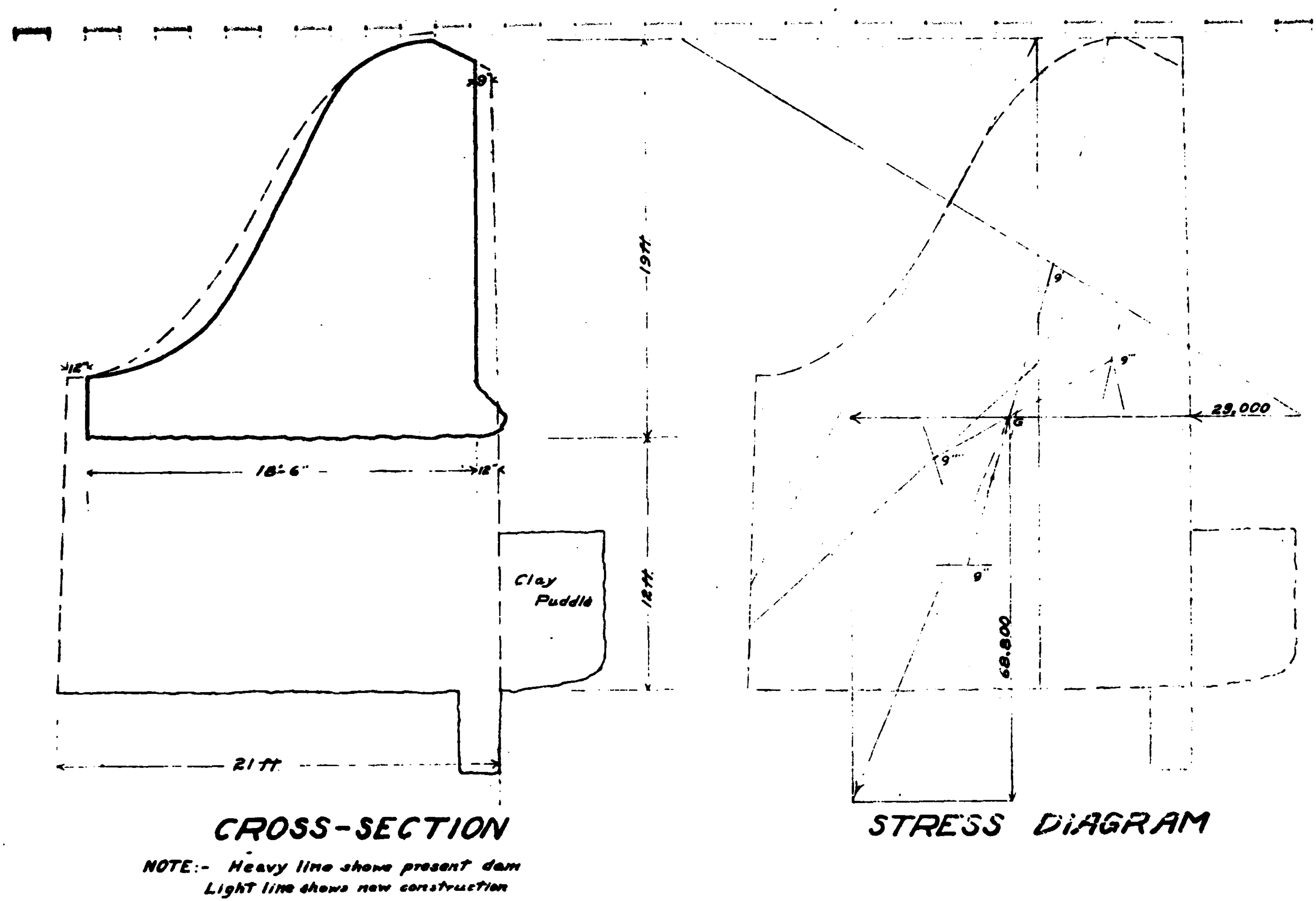
LOCATION PLAN

FIGURE 1



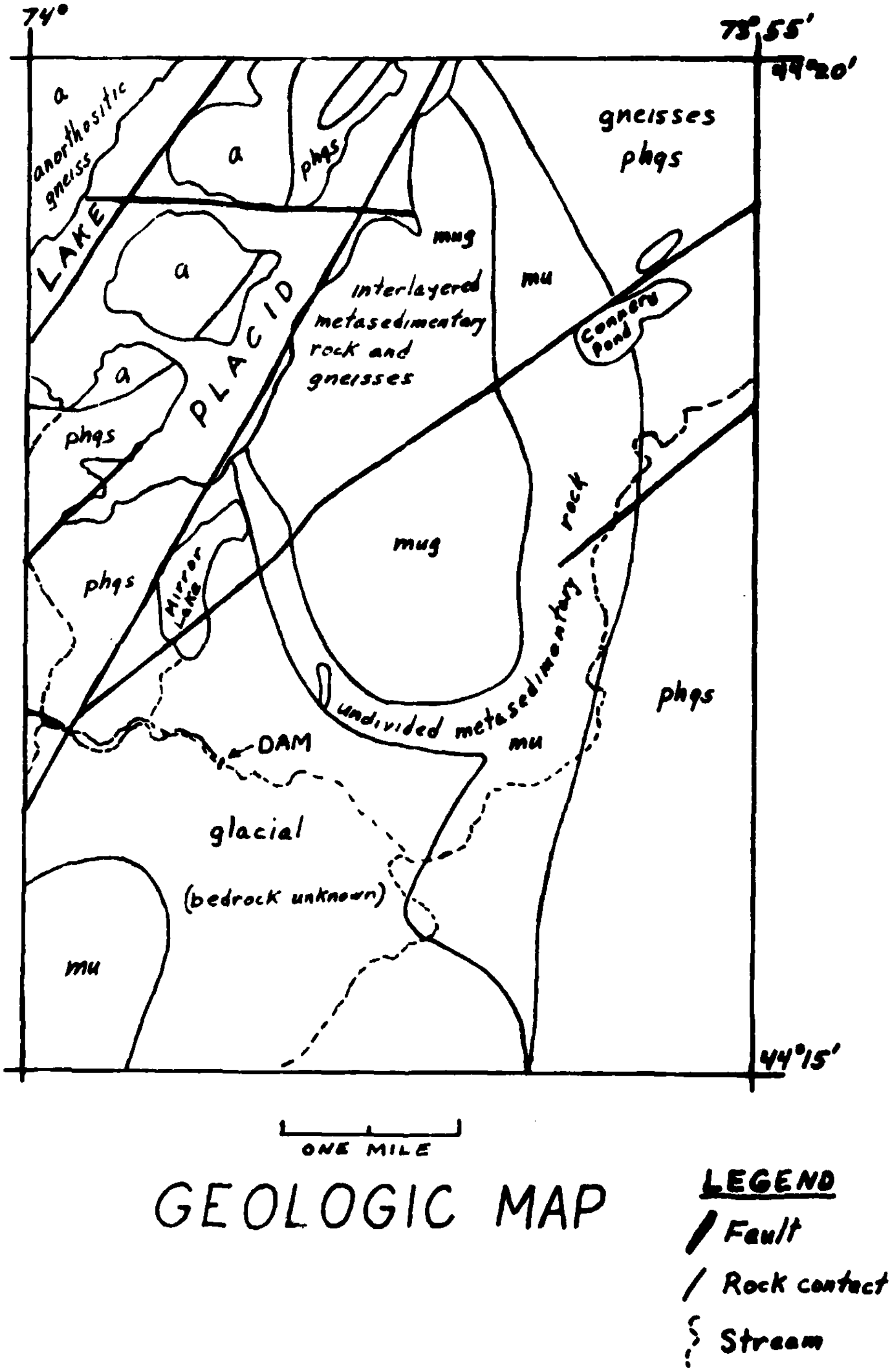
Present crest
Cut away as required to secure good bond
Both front and back faces of dam
scarified, all defective material removed, and
with an apron of concrete, the concrete to be
reinforced with steel mesh supported by dowels.
Bottom of present concrete
This material to be excavated in alternating sections not more than 12 ft. in width, and the concrete allowed to set for 6 days after pouring before removing earth from adjoining sections.
12 ft.
Approx. depth of firm bearing soil
ELEVATION
N
Forebay
Present wingwall
70 ft.
PLAN
LAKE PLACID VILLAGE
DAM CONSTRUCTION
SCALE 1" = 5 FT.
JUNE 1936
C.W. JUDSON, C.E.

FIGURE 2



LAKE PLACID VILLAGE
DAM CONSTRUCTION
SCALE 1" = 4 FT. JUNE 1936
C. W. JUDSON, C.E.

FIGURE 3



GEOLOGIC MAP

APPENDIX A

FIELD INSPECTION REPORT

CHECK LIST
VISUAL INSPECTION

PHASE 1

Name Dam Lake Placid Village Power Pond Dam **County** Essex **State** New York **ID #** NY-781

Type of Dam Concrete-Gravity **Hazard Category** High

Date(s) Inspection April 22, 1980 **Weather** Snowing **Temperature** 38°F

Pool Elevation at Time of Inspection 5" over spillway M.S.L. **Tailwater at Time of Inspection** No Measurement Taken

Inspection Personnel:

J. A. Gomez	Dale Engineering Company	
F. W. Byszewski	Dale Engineering Company	
D. F. McCarthy	Dale Engineering Company	
H. Muskatt	Dale Engineering Company	
J. VonDell	Assistant Supt. of Village of Lake Placid Electric Company	

J. A. Gomez **Recorder**

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	No seepage observed through concrete. Water was flowing over spillway at time of inspection obscuring face of spillway.	Approximately 6 ft. from top of right abutment and 4 ft. towards bank from spillway section a 1-inch diameter hole was observed. This hole seems
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Significant deterioration/undercutting of the left and right abutment walls at the spillway crest level at the junction of the spillway and abutment walls.	to have been a source of seepage in the past, as evidenced by the lime deposited on the concrete below the hole. This hole was not seeping at time of inspection; appeared to be self-plugged.
DRAINS	Not applicable.	
WATER PASSAGES	See section on outlet works.	
FOUNDATION	Dam appears to be sited on soil.	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Substantial deterioration of the ogee spillway. Chunks of concrete missing, especially near middle third of spillway and towards left abutment. Rooster tails across dam face, indicating some deterioration of spillway face.	Concrete of non-overflow sections was tapped with hammer - indicated concrete to be pretty sound.
STRUCTURAL CRACKING	Minor cracks in abutment walls. Toe of right abutment wall has been eroded and the masonry wall of channel in that area is in ruins.	Tree roots in toe of right abutment adjacent to dam.
VERTICAL & HORIZONTAL ALIGNMENT	Slightly arched toward upstream, which appears to conform with plans.	
MONOLITH JOINTS	None visible.	
CONSTRUCTION JOINTS	None visible.	
STAFF GAGE OF RECORDER	Not applicable.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	Not applicable.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	Not applicable.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed.	
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	Not applicable.	
RIPRAP FAILURES	Not applicable.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Abutments appear to be keyed into natural ground.	
ANY NOTICEABLE SEEPAGE	None observed.	
STAFF GAGE AND RECORDER	Not applicable.	
DRAINS	Not applicable.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Ogee crested. Portions of concrete spalled as previously noted.	
APPROACH CHANNEL	Formed by pond behind dam.	
DISCHARGE CHANNEL	Contained by masonry walls to the electric substation downstream. Wall near right abutment has toppled into stream. Rest of wall appears to still be standing.	
BRIDGE AND PIERS	Not applicable.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE S!LL	Not Applicable.	
APPROACH CHANNEL	Not Applicable.	
DISCHARGE CHANNEL	Not Applicable.	
BRIDGE AND PIERS	Not Applicable.	
GATES AND OPERATION EQUIPMENT	Not Applicable.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Not applicable.	
INTAKE STRUCTURE		Bar rack at intake to penstock.
OUTLET STRUCTURE	36-inch diameter metal pipe (waste tube) used as low level outlet, through left non-overflow section.	Also 5'-4" diameter (per plans) penstock extends to former generating station downstream. Not used now, but supposedly operational.
OUTLET CHANNEL	Stream below dam, at left abutment.	Reportedly, the penstock has been breached somewhere between dam and powerhouse, and flow from the pipe diverted back to Chubb River.
EMERGENCY GATE	Gate mechanism appeared to be operable. Reportedly, some debris caught in gate so couldn't be fully closed at time of inspection. Sluice gate controlled from the top of non-overflow wall. Water flowing through waste tube at time of inspection.	Manually-operated wooden gate controls flow through penstock. The rack appeared to be somewhat in the open position at the time of inspection.

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Some trees in stream, although fairly clean for most of reach to substation. Stream contained by masonry walls as wide as 45 ft.	Bridge 400 ft. downstream of dam; 28 ft. wide by 10 ft. high.
SLOPES	Supercritical slope until at least past the substation.	
APPROXIMATE NO. OF HOMES AND POPULATION	Electrical substation and offices at site of former generating station, approximately 800 ft. downstream. Normally 3-4 people work at these offices, could be as many as 12 or more people	Ground floor of offices approximately 11 ft. above stream bottom.
	including the field personnel that works out of this office.	

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Steep, up to 15-20%.	
SEDIMENTATION	Not observable.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE 1

NAME OF DAM Lake Placid Village Dam
ID # NY781

ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	USGS Map.
CONSTRUCTION HISTORY	Very limited, mostly limited to proposed construction and not as-builts and most information more than 40 years old.
TYPICAL SECTIONS OF DAM	Proposed typical section and plan dated 1936.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	As per 1936 plan.
RAINFALL/RESERVOIR RECORDS	None available.

ITEM	REMARKS
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	*Results of stress computations shown on 1936 section.*
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Boring logs from Hydroelectric Feasibility Study of Chubb River Sites for Village of Lake Placid, January 1979.
POST-CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	None.

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	As per 1936 proposed plan.
HIGH POOL RECORDS	None available.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None available.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Correspondence, see Appendix B.
MAINTENANCE OPERATION RECORDS	None Available.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	Typical section and plan per 1936 proposed plans.
OPERATING EQUIPMENT PLANS & DETAILS	None Available.

CHECK LIST
HYDROLOGIC & HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Mountainous, many lakes.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 70 ac.-ft. @ elev. 1706

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 102 ac.-ft. @ elev. 1710

ELEVATION MAXIMUM DESIGN POOL: Unknown.

ELEVATION TOP DAM: 1710

CREST:

a. Elevation 1706
b. Type Ogee spillway.
c. Width Not Applicable.
d. Length 70 feet
e. Location Spillover Middle of dam
f. Number and Type of Gates None

OUTLET WORKS:

a. Type 5'-4" penstock
b. Location North abutment
c. Entrance Inverts Unknown
d. Exit Inverts Unknown.
e. Emergency Draindown Facilities 36" diameter waste tube

HYDROMETEOROLOGICAL GATES:

a. Type None
b. Location None
c. Records None.

MAXIMUM NON-DAMAGING DISCHARGE: Unknown

APPENDIX B

PREVIOUS INSPECTION REPORTS/RELEVANT CORRESPONDENCE

RB	CTY	YR AP.	DAM NO.	INS. DATE	USE	TYPE
04	16	36	000592	030970	002	5

AS BUILT INSPECTION

1	Location of Sp'way and outlet	1	Elevations
1	Size of Sp'way and Outlet	1	Geometry of Non-overflow section

1 GENERAL CONDITION OF NON-OVERFLOW SECTION

2	Settlement	2	Cracks	1	Deflections
2	Joints	2	Surface of Concrete	1	Leakage
2	Undermining	2	Settlement of Embankment	1	Crest of Dam
2	Downstream Slope	2	Upstream Slope	1	Toe of Slope

1 GENERAL COND. OF SP'WAY AND OUTLET WORKS

4	Auxiliary Spillway	2	Service or Concrete Sp'way	1	Stilling Basin
2	Joints	2	Surface of Concrete	1	Spillway Toe
2	Mechanical Equipment	1	Plunge Pool	1	Drain

2	Maintenance	C	Hazard Class
3	Evaluation	34	Inspector

COMMENTS:

Surface of Concrete is Spald
Some cracks in wingwalls but not leaking
No longer used for power
Power substation below dam

1. River Basin - Nos. 1-23 on Compilation Sheets
2. County - Nos. 1-62 Alphabetically
3. Year Approved -
4. Inspection Date - Month, Day, Year
5. Apparent use -
   1. Fish & Wildlife Management
   2. Recreation
   3. Water Supply
   4. Power
   5. Farm
   6. No Apparent Use
6. Type -
   1. Earth with Aux. Service Spillway
   2. Earth with Single Conc. Spillway
   3. Earth with Single non-conc. Spillway
   4. Concrete
   5. Other
7. As-Built Inspection - Built substantially according to approved plans and specifications

Location of Spillway and Outlet Works

1. Appears to meet originally approved plans and specifications.
2. Not built according to plans and specifications and location appears to be detrimental to structure.
3. Not built according to plans and specifications but location does not appear to be detrimental to structure.

Elevations

1. Generally in accordance to approved plans and specifications as determined from visual inspection and use of hand level.
2. Not built according to plans and specifications and elevation changes appear to be detrimental to structure.
3. Not built according to plans and specifications but elevation changes do not appear to be detrimental to structure.

Size of Spillway and Outlet Works

1. Appears to meet originally approved plans and specifications as determined by field measurements using tape measure.
2. Not built according to plans and specifications and changes appear detrimental to structure.
3. Not built according to plans and specifications but changes do not appear detrimental to structure.

Geometry of Non-overflow Structures

1. Generally in accordance to originally approved plans and specifications as determined from visual inspection and use of hand level and tape measure.
2. Not built according to plans and specifications and changes appear detrimental to structure.
3. Not built according to plans and specifications but changes do not appear detrimental to structure.

General Conditions of Non-Overflow Section

1. Adequate - No apparent repairs needed or minor repairs which can be covered by periodic maintenance.
2. Inadequate - Items in need of major repair.

ITEMS For boxes listed on condition under non-overflow section.
1. Satisfactory.
2. Can be covered by periodic maintenance.
3. Unsatisfactory - Above and beyond normal maintenance.

1. Adequate - No apparent repairs needed or minor repairs which can be covered by periodic maintenance.
2. Inadequate - Items in need of major repair.

Items) For boxes listed conditions listed under spillway and outlet works.
1. Satisfactory.
2. Can be covered by periodic maintenance.
3. Unsatisfactory - Above and beyond normal maintenance.
4. Dam does not contain this feature.

Maintenance

1. Evidence of periodic maintenance being performed.
2. No evidence of periodic maintenance.
3. No longer a dam or dam no longer in use.

(S.C.S.) Hazard Classification Downstream

CLASSIFICATI
CORPS ENGRS

1. (A) Damage to agriculture and county roads. (III)
2. (B) Damage to private and/or public property. (II)
3. (C) Loss of life and/or property. (I)

Evaluation - Based on Judgment and Classification in Box Nos.

Evaluation for Unsafe Dam

1. Unsafe - Repairable.
2. Unsafe - Not Repairable.
3. Insufficient evidence to declare unsafe.

RIVER BASINS

(1) LOWER HUDSON
(2) UPPER HUDSON
(3) MOHAWK
(4). LAKE CHAMPLAIN
(5) DELAWARE
(6) SUSQUEHANNA
(7) CHEMUNG
(8) OSWEGO
(9) GENESEE
(10) ALLEGHENY
(11) LAKE ERIE
(12) WESTERN LAKE ONTARIO
(13) CENTRAL LAKE ONTARIO
(14) EASTERN LAKE ONTARIO
(15) SALMON RIVER
(16) BLACK RIVER
(17) WEST ST. LAWRENCE
(18) EAST ST. LAWRENCE
(19) RACQUETTE RIVER
(20) ST. REGIS RIVER
(21) HOUSATONIC
(22) LONG ISLAND
(23) OSWEGATCHIE
(24) GRASSE

COUNTIES

STATE NAME: NEW YORK

STATE ABBREVIATION: NY

STATE CODE: 36

CODE	COUNTY NAME
1	ALBANY
2	ALLEGANY
3	BRONX
4	BROOME
5	CATTARAUGUS
6	CAYUGA
7	CHAUTAUQUA
8	CHEMUNG
9	CHENANGO
10	CLINTON
11	COLUMBIA
12	CORTLAND
13	DELAWARE
14	DUTCHESS
15	ERIE
16	ESSEX
17	FRANKLIN
18	FULTON
19	GENESEE
20	GREENE
21	HAMILTON
22	HERKIMER
23	JEFFERSON
24	KINGS
25	LEWIS
26	LIVINGSTON
27	MADISON
28	MONROE
29	MONTGOMERY
30	NASSAU
31	NEW YORK
32	NIAGARA
33	ONEIDA
34	ONONDAGA
35	ONTARIO
36	ORANGE
37	ORLEANS
38	OSWEGO
39	OTSEGO
40	PUTNAM
41	QUEENS
42	RENSSELAER
43	RICHMOND
44	ROCKLAND
45	ST LAWRENCE
46	SARATOGA
47	SCHENECTADY
48	SCHOHARIE
49	SCHUYLER
50	SENECA
51	STEUBEN
52	SUFFOLK
53	SULLIVAN
54	TIOGA
55	TOMPKINS
56	ULSTER
57	WARREN
58	WASHINGTON
59	WAYNE
60	WESTCHESTER
61	WYOMING
62	YATES

Form E-61
9-11-34-500 (11E-1836)

STATE OF NEW YORK

DEPARTMENT OF PUBLIC WORKS

DIVISION OF ENGINEERING

ALBANY

Received Sept. 28, 1936 Dam No. 599

Disposition Sept. 28, 1936 Watershed Lake Champlain

Foundation inspected

Structure inspected

Application for the Construction or Reconstruction of a Dam

Application is hereby made to the Superintendent of Public Works, Albany, N. Y., in compliance with the provisions of Section 948 of the Conservation Law (see last page of this application) for the approval of specifications and detailed drawings, marked Lake Placid Village - Dam Construction (2 sheets) No detail drawings can be made until site is unwatered and test pits dug. herewith submitted for the { construction / reconstruction } of a dam herein described. All provisions of law will be complied with in the erection of the proposed dam. It is intended to complete the work covered by the application about Nov. 15, 1936
(Date)

1. The dam will be on Chubb river flowing into Ausable river in the town of North Elba, County of Essex and one-half mile southeast of D.& H.R.R. station
(give exact distance and direction from a well-known bridge, dam, village main cross-roads or mouth of a stream)

2. Location of dam is shown on the Lake Placid quadrangle of the United States Geological Survey.

3. The name of the owner is Lake Placid Village

4. The address of the owner is Lake Placid N.Y.

5. The dam will be used for Power development

6. Will any part of the dam be built upon or its pond flood any State lands? no

7. The watershed above the proposed dam is thirty-nine square miles

8. The proposed dam will create a pond area at the spillcrest elevation of six acres and will impound Approx. 1,000,000 cubic feet of water.

9. The maximum height of the proposed dam above the bed of the stream is 12 feet ______ inches.

10. The lowest part of the natural shore of the pond is four feet vertically above the spillcrest, and everywhere else the shore will be at least ______ feet above the spillcrest.

11. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam No. When dam was undermined and failed during flood conditions no damage resulted.

12. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) hardpan and boulders.

13. Facing down stream, what is the nature of material composing the right bank? As above and covered with topsoil

14. Facing down stream, what is the nature of the material composing the left bank? As above.

15. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. Impervious, nonwaterbearing.

16. Are there any porous seams or fissures beneath the foundation of the proposed dam? No.

17. Wastes. The spillway of the above proposed dam will be 70 feet long in the clear; the waters will be held at the right end by a Conc. wingwall the top of which will be four feet above the spillcrest, and have a top width of four feet; and at the left end by a Conc. wingwall the top of which will be four feet above the spillcrest, and have a top width of four feet.

18. The spillway is designed to safely discharge Did discharge on Oct. 2, 1924, 1517 sec.ft. cubic feet per second.

19. Pipes, sluice gates, etc., for flood discharge will be provided through the dam as follows:
As at present, one 42" pipe for draining pond, and 66" penstock.

20. What is the maximum height of flash boards which will be used on this dam? 12"

21. Apron. Below the proposed dam there will be an apron built of Present apron shown on plans. feet long across the stream, ______ feet wide and ______ feet thick.

22. Does this dam constitute any part of a public water supply? No.

INSTRUCTIONS

Read carefully on the last page of this application the law setting forth the requirements to be complied with in order to construct or reconstruct a dam.

Each application for the construction or reconstruction of a dam must be made on this standard form, copies of which will be furnished upon request to the Chief Engineer, Division of Engineering, Department of Public Works, Albany, N. Y. The application must be accompanied by three sets of plans, and specifications. The information furnished must be in sufficient detail in order that the stability and safety of the dam can be determined. In cases of large and important dams assumptions made in calculating stresses and stability should be given.

Samples of materials to be used in the dam and of the material on which the dam is to be founded may be asked for, but need not be furnished unless requested.

If the dam constitutes a part of a public water supply, application should be made to the Water Power and Control Commission under Article XI of the Conservation Law.

An application for the construction or reconstruction of a dam must be signed by the prospective owner of the dam or his duly authorized agent. The address of the signer and the date must be given as provided for on the last page of the application form.

The present dam, which is of concrete, was built about thirty years ago, but the footing was not carried down to a firm foundation at that time. However, failure would probably not have taken place except for the fact that a testpit was dug last fall to determine the depth of the present footing and was not backfilled. The high water early in the summer forced a channel thru underneath the structure, and now the dam is undermined for nearly the entire length and remains suspended by the wingwalls. The wingwalls apparently have a good bearing and have shown no indication of failure.

The superstructure of the present dam will remain unchanged as it has stood for thirty years. The reconstruction will consist only of carrying the concrete down to a solid, impervious foundation.

No detail plans will be available until testpits have been made.

SECTION 948 OF THE CONSERVATION LAW

§ 948. **Structures for impounding water; inspection of docks; penalties.** No structure for impounding water and no dock, pier, wharf or other structure used as a landing place on waters shall be erected or reconstructed by any public authority or by any private person or corporation without notice to the superintendent of public works, nor shall any such structure be erected, reconstructed or maintained without complying with such conditions as the superintendent of public works may by order prescribe for safeguarding life or property against danger therefrom. No order made by the superintendent of public works shall be deemed to authorize any invasion of any property rights, public or private, by any person in carrying out the requirements of such order. The superintendent of public works shall have power, whenever in his judgment public safety shall so require, to make and serve an order directing any person, corporation, officer or board, constructing, maintaining or using any structure hereinbefore referred to, remove, repair or reconstruct the same within such reasonable time and in such manner as shall be specified in such order, and it shall be the duty of every such person, corporation, officer or board, to obey, observe and comply with such order and with the conditions prescribed by the superintendent of public works for safeguarding life or property against danger therefrom, and every person, corporation, officer or board failing, omitting or neglecting so to do, or who hereafter erects or reconstructs any such structure hereinbefore referred to without submitting to the superintendent of public works and obtaining his approval of plans and specifications for such structures when required so to do by his order or who hereafter fails to remove, erect or to reconstruct the same in accordance with the plans and specifications so approved shall forfeit to the people of this state a sum not to exceed five hundred dollars to be fixed by the court for each and every offense; every violation of any such order shall be a separate and distinct offense, and, in case of a continuing violation, every day's continuance thereof shall be and be deemed to be a separate and distinct offense. This section shall not apply to a dam where the area draining into the pond formed thereby does not exceed one square mile, unless the dam is more than ten feet in height above the natural bed of the stream at any point or unless the quantity of water which the dam impounds exceeds one million gallons; nor to a dock, pier, wharf or other structure under the jurisdiction of the department of docks, if any, in a city of over one hundred and seventy-five thousand population. This section as hereby amended shall not impair the effect of an order heretofore made by the conservation commission or commissioner under this section prior to the taking effect of chapter four hundred and ninety-nine of the laws of nineteen hundred and twenty-one, nor require the approval by the superintendent of public works of plans and specifications heretofore approved by such commission or commissioner under this section.

The foregoing information and accompanying plans and specifications are correct to the best of my knowledge and belief.

LAKE PLACID VILLAGE, INCORPORATED, **Owner**

By [signature] ~~authorized~~ **agent of owner.**
Village Clerk

Address of signer Lake Placid, New York **Date** September 26th, 1936

Form W31. 5-12 15 2000 (16-16758) Acc. 38a

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

STATE OF NEW YORK
CONSERVATION COMMISSION
ALBANY

DAM REPORT

July 23 (Date), 1919

CONSERVATION COMMISSION,

DIVISION OF WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the Power House Dam.

This dam is situated upon the Chub River (Give name of stream) in the Town of North Elba, Essex County, about 2 (State distance) from the Village or City of Newman

The distance up (Up or down) stream from the dam, to the Newman Bridge (Give name of nearest important stream or of a bridge); is about 1/4 mile (State distance)

The dam is now owned by Village of Lake Placid (Give name and address in full) and was built in or about the year 1905, and was extensively repaired or reconstructed during the year ....

As it now stands, the spillway portion of this dam is built of concrete (State whether of masonry, concrete or timber) and the other portions are built of concrete (State whether of masonry, concrete, earth or timber with or without rock fill)

As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is rock & gravel and under the remaining portions such foundation bed is rock & gravel

1848.001.120

NEW YORK STATE

ENERGY RESEARCH AND DEVELOPMENT AUTHORITY

ALBANY, NEW YORK

SUBCONTRACT NO. 1 TO PRIME CONTRACT NO. EW-F-07-1771

HYDROELECTRIC FEASIBILITY STUDY

CHUBB RIVER SITES

VILLAGE OF LAKE PLACID, NEW YORK

JANUARY 1979

O'BRIEN & GERE ENGINEERS, INC.

1304 BUCKLEY ROAD

SYRACUSE, NEW YORK 13221

SECTION 2 - HYDROLOGY

2.01 General

The Mill pond and Power Pond Dams are located about one third of a mile apart on the Chubb River. The drainage area upstream of the dams is approximately 40 square miles and lies within the "High Peaks" region of the Adirondack Mountains, which is typified by steep, tree-covered terrian. The Chubb River drainage basin is divided into two sub-basins with different hydrologic characteristics. The southern part of the basin has an area of approximately 21 square miles and contributes runoff and groundwater flows directly into the Chubb River. The northern portion of the basin has an area of about 19 square miles and is dominated by Lake Placid, which has a surface area of about 3.5 square miles. Discharge from the two sub-basins is combined at the Mill Pond reservoir and continues down the Chubb River to it's confluence with the West Branch of the Ausable River about 2 miles to the east. (See Figure 2-1)

2.2 Flow-Duration Curves

Two indirect methods were used to determine the flow-duration curves for the Chubb River at the dams, since there are no stream gages located on the Chubb River. The first method was to evaluate stream flow records at a nearby location and transpose the results to the Chubb River at the dams. A United States Geological Survey stream flow gage, located about 2 miles downstream from the confluence of the Chubb River and the West Branch of the Ausable River, was in continuous use from 1919 to 1968. The drainage area of the West Branch of the Ausable River

upstream of this gage is about 116 square miles. Average daily discharges from this gage were used to develop a Flow-Duration Curve at this location. A Flow-Duration Curve for the Chubb River at the dams was then developed from this curve based on a direct relationship of the drainage areas (Curve B, Figure 2-2).

The second method involved the use of monthly power production records for the Village electric system hydroelectric plant downstream of the Power Pond Dam which was in operation from 1905 to 1957. The available records covered the years 1939 to 1957. Since the hydraulic characteristics of the penstock supplying water to the turbines is known, an equation relating power and discharge was used to calculate discharges (Curve A, Figure 2-2).

Figure 2-2 indicates that Curve B yields about 20% more discharge than Curve A. This difference is attributable to the following factors: (1) Curve A excludes discharges in the Chubb River not used for power generation. (2) The transposed Flow-Duration Curve from the West Branch of the Ausable River gage does not fully reflect the regulating effect of Lake Placid upon the Chubb River. (3) The power generation records are based on average monthly flow, not daily flows, whereas the records for the West Branch of the Ausable River are based on daily flows. The correlation between these curves is reasonable and provides a good basis for determining the availability of flow for the production of power at the two sites. Since Curve A was developed from historical data reflecting the Chubb River flows actually used for power production, it is considered to be more reliable and has been used as a basis of estimating average annual power production.

2.03 Flood Flows

The United States Army Corps of Engineers has established hydrologic guidelines for evaluating the safety of existing dams. According to the "Recommended Guidelines for Safety Inspection of Dams," by the Corps of Engineers, both Mill Pond and Power Pond Dams should be classified as "high hazard" structures because failure of either structure would result in extensive property damage. Therefore, according to the Guidelines, the spillway capacity of each dam should be sufficient to pass 50% of the Probable Maximum Flood (PMF). The PMF is defined as the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. The Probable Maximum Precipitation (PMP), which is used as a basis for determining the PMF, was obtained from "Hydrometeorological Report No. 33" prepared by the United States Weather Service. Unit hydrographs were calculated using average basin coefficients. Calculations were made with the assistance of computer program HEC-1, developed by the Hydrologic Engineering Center, U.S. Army Corps of Engineers. PMG runoff hydrographs were computed for each sub-area, and were combined and routed through the Mill Pond and Power Pond Reservoirs. The PMF at the dams has a peak discharge of 8,200 cubic feet per second (cfs), which is reduced only slightly by storage in the reservoirs. This peak discharge would produce a reservoir elevation of about 10 feet over the Mill Pond spillway crest and about 8.5 feet over the Power Pond spillway crest. Since the Mill Pond Dam abutments are overtopped when the flow over the spillway exceeds 5.5 feet and the Power Pond abutments are overtopped when the flow over the spillway exceeds 4 feet, neither spillway is hydraulically adequate to pass one-half of the PMF without affecting the areas adjacent to the dams.

2.04 Existing Water Quality

Water Quality data for the Chubb River is limited to information available from the NYSDEC Water Quality Analysis Unit and the New York State Department of Health. Water Quality criteria and standards have been assigned to all surface waters in the state as defined by Chapter 10 of the Environmental Conservation Law. Classifications and definitions for the Chubb River and tributaries can be found in Tables 1 and 2. The water quality classification for the Mill Pond and Power Pond is C(T) as shown on the biological resources map (Figure 5-5).

In November 1976 the Survey and Analysis Section of DEC conducted a Waste Assimilative Capacity study (WAC) on the Chubb River below the wastewater discharge of the Lake Placid Sewage Treatment Plant (STP). The survey also established New York Pollution Discharge Elimination System (NYPDES) permit effluent limitations for the Village STP discharge. The physical and chemical parameters were analyzed by the laboratories of the NYS Department of Health. Altogether five (5) sites were sampled on the Chubb River and can be located on Figure 2-3 according to station number.

2.05 Water Quality Impact

The New York State Department of Environmental Conservation has established a minimum flow requirement for the Chubb River above the Village of Lake Placid's STP. A critical stream flow of 7 cubic feet per second was assigned to the Chubb River above the STP so that the assimilative capacity of the river with the wastewater discharge from the STP would meet State Pollutant Discharge Elimination System effluent limitations. Operation of the hydroelectric generating facilities at both

dam sites would comply with the minimum stream flow standards set by the State. The DEC has determined that the 7 cfs stream flow regulation includes the discharges from the generators.

Short term water quality impacts can be associated with generator construction and dam repair activities. Construction of generating facilities along the Chubb River stream bank at both Power Pond and Mill Pond Dam sites would cause a disruption of soil layers. Due to the close proximity of the generating sites to the stream bank, it is conceivable that siltation of the river waters might occur which could create turbid water conditions downstream. However, these impacts can be minimized by precautionary reseeding and sod covering techniques.

Permanent alteration of existing water quality will not occur as a result of hydroelectric generating operations on the Chubb River.

3.02 Power Pond Dam and Appurtenances

The Power Pond Dam, constructed in 1905, is an ogee-shaped, concrete gravity overflow structure. The dam is about 20 feet high, 136 feet long and has a top width of about 6 feet. (See Figures 3-2 and 3-3) A concrete gatehouse with a wood frame superstructure is located at the north abutment of the dam. The gatehouse contains a manually operated wooden gate which controls discharge into a 5'-4" diameter steel penstock. The penstock extends about 800 feet downstream and terminates at the powerhouse, which is presently being used for offices and storage by the Lake Placid Municipal Electric Department. The penstock has been breached about 530 feet downstream of the dam, and flow through the pipe is diverted into the Chubb River by a 30" diameter corrugated metal pipe. A 36" waste tube pipe with an outlet invert about 17 feet below the spillway crest runs through the dam between the spillway section and the gatehouse. Discharge into the pipe is controlled by a sluice gate operated from the dam crest.

The Power Pond reservoir covers an area of about 9 acres, has a maximum length of about 1,200 feet and has an estimated storage volume of 100 acre-feet at the spillway crest elevation.

Visual inspections of the Power Pond Dam and its appurtenances were performed on November 29, 1978 and on December 29, 1978. River discharge over the spillway and ice and snow restricted visual observations during the inspection. The concrete forming the spillway crest contains minor cracks and some irregular-shaped sections about two inches thick have been broken away. Both concrete abutments showed evidence of deterioration with aggregate being exposed over much of their surface area. The abutment adjacent to the south end of the spillway

section has been partially undermined so that spillway discharge cascades onto the blow-off pipe outlet and the stone retaining wall which forms the south stream bank. The operating assembly for the sluice gate controlling discharge into the blow-off pipe was intact but not operated during the inspection. The wood frame gatehouse is in fair condition. Five courses of the clapboard siding have been removed, by vandals, along the entire length of the eastern side of the building. The closed wooden control gate, its operating assembly and the trash racks appeared to be intact and serviceable, although the gate was not operated during the inspection. The interior of the buried penstock was not inspected because of the difficulty in obtaining access to the inside of the pipe. The portion of the penstock in the vicinity of the breach, however, was inspected in 1977 and found to be in excellent condition. The existing powerhouse is in good condition and is being used by the Village of Lake Placid for offices and storage. A rivited steel surge tank is located northwest of the powerhouse. The surge tank appears in good condition, however, pressure tests should be performed to verify its condition. This is particularly important since a major electrical substation owned by the Village is located immediately adjacent to the surge tank. The surge tank is enclosed by a wood frame structure which is in generally good condition. The surge tank was not used during the latter years of generation at the powerhouse and was isolated by a gate valve located at the bottom of the tank.

The powerhouse once contained both a vertical axis turbine and a horizontal axis turbine. The turbine runner and case of the horizontal unit were damaged in 1952. The damage was never repaired and all vestiges of the horizontal unit, with the exception of a gate valve and a

short riser from the penstock, have been removed. The turbine housing, wicket gates, runner, and draft tube for the vertical unit are still in place. A 2' x 3' hole has been cut in the turbine casing and the wicket gates are frozen in the shut position. Heavy and deep rust was noted. The turbine shaft has been cut about 4' above the wicket gates and the opening above the turbine has been covered and concreted. The generator and all control equipment has been removed. The runner was not accessable for inspection. The turbine has not been operated or maintained during the last 10 years.

The stability of the Power Pond Dam was analyzed with the reservoir at the spillway crest, for headwater and tailwater conditions produced by 50% of the Probable Maximum Flood, and for conditions between these extremes. The cross-section for the dam was taken from drawings provided by the Village of Lake Placid (See Figures 3-2, 3-3, and 3-4). Detailed design or as-built information of the dam was not available for our review.

The available drawings for the Power Pond Dam do not indicate the type of foundation on which the dam is based nor what type of seepage barrier, if any, exists beneath the dam foundation. Therefore, a subsurface investigation was undertaken to obtain information regarding the dam foundation. O'Brien & Gere Engineers contracted with Atlantic Testing Laboratories, Limited, of Canton, New York, to make two borings at the Power Pond Dam. Boring B-1, located near the north abutment, was driven to a depth of 50 feet, or about 25 feet below the base of the dam as shown on Figure 3-3. Boring B-2, located near the south abutment, was terminated at a depth of 40 feet, or about 15 feet below the base of the dam. The location of these borings is shown on Figure 3-2.

The soils encountered consisted of dense, well-graded sand and medium to fine gravel with a small fraction of silt. Significantly, neither boring encountered bedrock. The boring logs for this work are included in the Appendix.

It is concluded from the boring program that the Power Pond Dam is founded on overburden, not rock. Therefore, some type of seepage barrier must have been included in the design to prevent the progressive piping of fine-grained soil from underneath the dam. However, there is no record of the type or depth of this barrier.

The results of the stability analysis of the Power Pond Dam are shown on Figure 3-4 and in Table 3-1. This analysis is based on the assumption of full uplift over one hundred percent of the base. The presence of a seepage barrier would reduce the uplift pressures and increase the factors of safety. However, the assumption of full uplift is necessary until further information regarding the type, extent and effectiveness of the seepage barrier is known or until measurements of actual uplift pressures are made.

TABLE 3-1

Height of Pool Above Spillway Crest in Feet	Factors of Safety	
	Overturning	Sliding
0	1.77	1.18
1	1.54	0.95
2	1.42	0.83
3	1.32	0.73
8.5 (1/2 PMF)	0.96	0.34

It is concluded from the results of the dam stability analysis that the Power Pond Dam may be unstable for reservoir elevations greater than one foot above the spillway crest. However, as stated above, the information regarding the construction of the dam is very limited and additional information is required to make definite conclusions regarding the stability of the dam and any remedial measures which may be required.

The additional investigations required, which are outside the scope of this Study, should consist of the following:

1. Borings upstream of the dam to determine whether a horizontal seepage barrier may have been constructed.
2. Borings in the channel downstream of the dam.
3. Borings through the dam to measure uplift pressure at the base of the structure.

ATLANTIC TESTING LABORATORY

CANTON, NEW YORK

SUBSURFACE INVESTIGATION

Report No. L283-1-1-79

CLIENT: O'Brien & Gere Engineers, Inc.
Justin & Courtney Division

Location of Boring: See Plan

PROJECT: Power Pond Dam
Village of Lake Placid

Date, start 12/27/78 Finish 12/29/78

Boring No. B-1 Sheet 1 of 2

Casing Hammer Wt. ____ lbs. Fall ____ in.

Sampler Hammer Wt. 140 lbs. Fall 30 in.

☐ ____ I.D. Casing

Ground Elev. ____ ☒ 3-1/4" I.D. H.S. Auger

Ground Water Observations

Date	Time	Depth	Casing at
12/27	4:30	11.0'	13.0'
11/28	5:00	13.0'	40.0'
11/29	8:00	20.0'	40.0

DEPTH	CASING BLOWS/FT.	SAMPLE NO.	DEPTH OF SAMPLE FROM	DEPTH OF SAMPLE TO	TYPE SAMPLE	BLOWS ON SAMPLER PER 6" (SAMPLER O.D. 2")	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f — fine, m — medium, c — coarse; and — 35–50%, some — 20–35%, little — 10–20%, trace — 0–10%)	DEPTH
			0.0	1.0		Auger		1.0' Frost Penetration	
	Air Rotary	1	1.0	3.0	ss	6-8-19-21		Brown cmf SAND; little mf GRAVEL; trace SILT (dry, non-plastic)	
			5.0	5.2	ss	20/0.2		No Recovery - Spoon bouncing on cobble; several cobbles from 3.0' to 5.0'	
		2	6.0	6.5	ss	110		Brown cm SAND; trace SILT; trace mf GRAVEL (moist, non-plastic)	
		3	10.0	11.5	ss	42-49-57	13.0	Dark Brown cmf SAND; little mf GRAVEL; trace SILT (wet, non-plastic)	
			13.0	14.0			14.0	Boulder	
		4	15.0	16.5	ss	41-34-67		Ditto (wet, non-plastic) Flowing Sand at 17.0'	
	3-1/4" I.D. Auger	5	20.0	21.5	ss	45-73-85		Brown cmf SAND; trace mf GRAVEL; trace SILT (wet, non-plastic) Rock Frags Flowing Sand at 20.0'	
		6	25.0	26.5	ss	55-61-87		Brown cmf SAND; trace f GRAVEL; trace SILT (wet, non-plastic)	
			30.0	31.0	ss	85-100		No Recovery - cobble Flowing Sand at 30.0'	
		7	35.0	36.5	ss	3-4-41		Brown mf SAND; trace SILT (wet, non-plastic)	
		8A	40.0	41.0		67-85	41.0	Ditto (moit, non-plastic)	
		8B	41.0	41.5		110		Dark Grey SILT; and f SAND (moist, non-plastic)	

SS — SPLIT SPOON SAMPLE
U — UNDIS. SHELBY TUBE
P — PISTON TYPE SAMPLE

DRILLERS Lewis Rice Patrick Sullivan

ATLANTIC TESTING LABORATORY

CANTON, NEW YORK

SUBSURFACE INVESTIGATION

Report No. L283-1-1-79

CLIENT: O'Brien & Gere Engineers, Inc.
Justin & Courtney Division

Location of Boring: See Plan

PROJECT: Power Pond Dam
Village of Lake Placid

Date, start 12/27/78 Finish 12/29/78

Boring No. B-1 Sheet 2 of 2

Casing Hammer
Wt. ______ lbs.
Fall ______ in.

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

☐ ______ I.D. Casing
☒ 2-1/4" I.D.H.S. Auger

Ground Elev. ______

Ground Water Observations

Date	Time	Depth	Casing at

DEPTH	CASING BLOWS/FT.	SAMPLE NO.	DEPTH OF SAMPLE from	to	TYPE SAMPLE	BLOWS ON SAMPLER PER 6" / SAMPLER O.D. 2"	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (F — FINE, M — MEDIUM, C — COARSE; AND — 35—50%, SOME — 20—35%, LITTLE — 10—20%, TRACE — 0—10%)	DEPTH
	2-1/4" I.D. Auger	9	45.0	46.5		51-108-125		Greyish Brown mf SILT; little f SAND (moist, non-plastic)	
		10	50.0	51.5		47-56-85		Ditto	
								Bottom Boring 51.5'	

SS — SPLIT SPOON SAMPLE
U — UNDIS. SHELBY TUBE.
P — PISTON TYPE SAMPLE.

DRILLERS Lewis Rice Patrick Sullivan

ATLANTIC TESTING LABORATORY

CANTON, NEW YORK

SUBSURFACE INVESTIGATION

Report No. L283-1-1-79

CLIENT: O'Brien & Gere Engineers, Inc.
Justin & Courtney Division

Location of Boring: See Plan

PROJECT: Power Pond Dam
Village of Lake Placid

Date, start 12/29/78 Finish 12/30/78

Boring No. B-2 Sheet 1 of 1

Casing Hammer: Wt. ______ lbs. Fall ______ in.

Sampler Hammer: Wt. 140 lbs. Fall 30 in.

☐ ______ I.D. Casing

Ground Elev. ______ ☑ 2-1/4" I.D. H.S. Auger

Ground Water Observations

Date	Time	Depth	Casing at
12/29	4:00	18.0'	40.0'
12/29	4:15	Caved in at 17'	O[illegible]

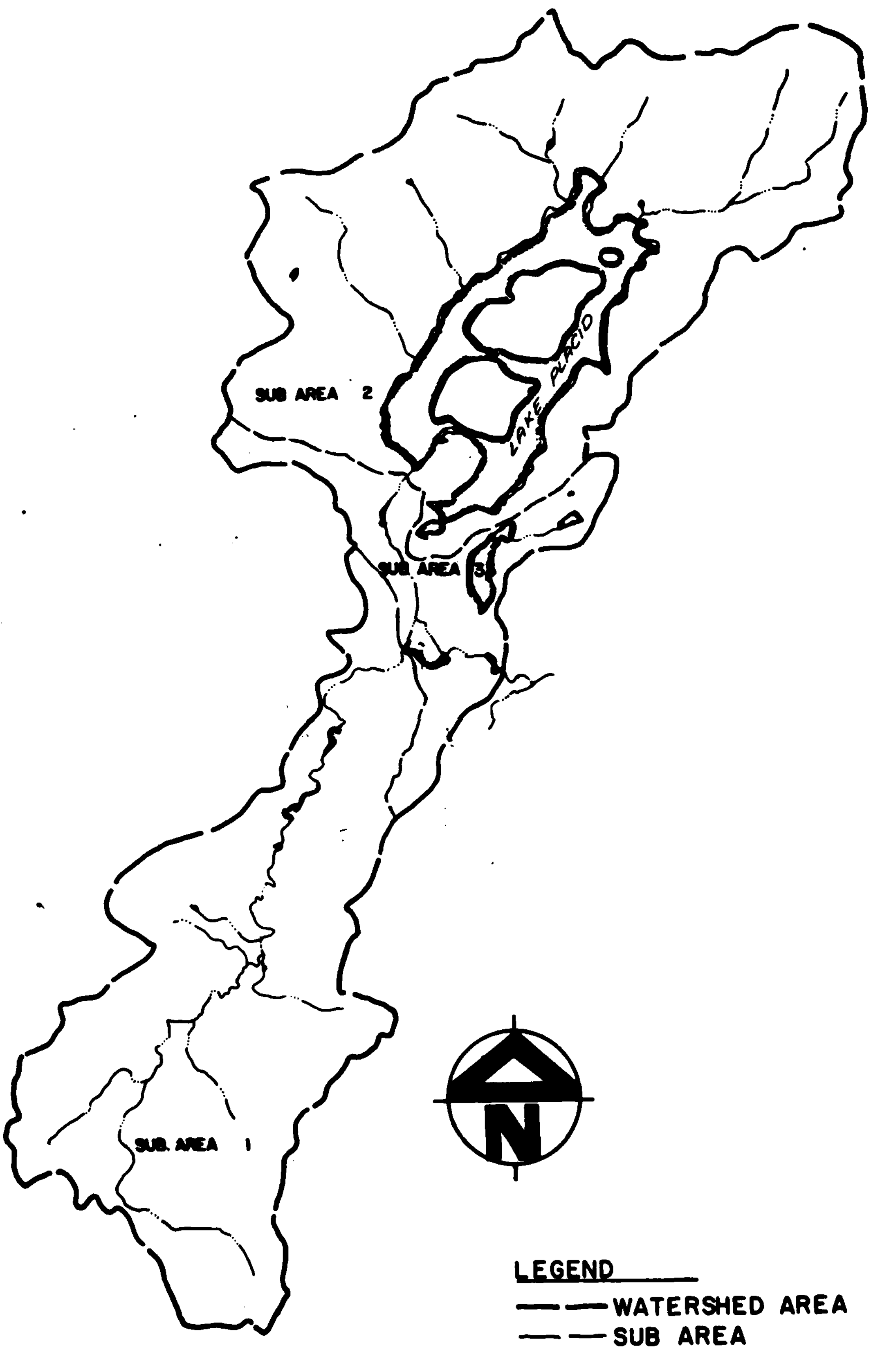
Depth	Casing Blows/Ft.	Sample No.	Depth of Sample From	Depth of Sample To	Type Sample	Blows on Sampler per 6" (Sampler O.D. 2")	Depth of Change	Classification of Material (f — fine, m — medium, c — coarse; and — 35–50%, some — 20–35%, little — 10–20%, trace — 0–10%)
		1A	0.0	0.5	ss	16	0.5	TOPSOIL and ORGANIC Material (wet non-plastic) Frozen
		1B	0.5	1.5	ss	12-10		Brown cmf SAND; trace mf GRAVEL; trace ORGANICS; trace SILT (moist, non-plastic)
		2	5.0	6.5	ss	41-50-55		Light Brown cmf SAND; trace f GRAVEL; trace SILT (moist, non-plastic)
		3	10.0	11.5	ss	21-32-37		Brown cm-f SAND; trace SILT (moist non-plastic)
		4	15.0	15.5	ss	34/0.4'-100/0"		Greyish Brown c-mf SAND; trace SILT; (moist, non-plastic)
	AUGER		18.0	24.0		---		Unable to sample due to continuous cobbles and boulders
		5	26.0	26.5	ss	103-100/0"		Brown cmf SAND; little mf GRAVEL with 1/2" to 1/2" pockets of SILT (wet, non-plastic)
		6	30.0	31.0	ss	56-97		Ditto
		7	35.0	35.5	ss	41-100/0"	40.0	Ditto
		8	40.0	40.5	ss	38-100/0"		Greyish Brown c-mf SAND; little SILT (wet, non-plastic)
								Bottom Boring 40.5'

ss — split spoon sample
u — undis. shelby tube
p — piston type sample

DRILLERS Lewis Rice Patrick Sullivan

APPENDIX C

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



LAKE PLACID
SUB AREA 2
SUB AREA 3
SUB. AREA 1
N
LEGEND
WATERSHED AREA
SUB AREA

STETSON • DALE BANKERS TRUST BUILDING UTICA • NEW YORK • 13501 DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspection 1980 DATE

SUBJECT Lake Placid - Power Pond Dam PROJECT NO.

DRAWN BY

Areas

Sub-area	Area	Area of Lakes
1	$14.0\ mi^2$	
2	20.6	$3.11\ mi^2$
3	3.7	0.28

Snyder Parameters

Subarea	C_t	L	L_{CA}	t_p
1	1.5	9.4 mi	4.1 mi	4.5 hr.
2	1.5	2.9	1.6	2.4 + .2 = 2.6*
3	1.5	5.	1.4	2.7

* Includes travel time through Lake Placid

Length of travel through Lake = 20,800'

Velocity, $V = \sqrt{g D_m}$ $g = 32.2\ ft/sec^2$

where mean depth, $D_m = 20'$ (assumed)

$V \approx 25\ fps$

$$t = \frac{20{,}800'}{25\ fps} \times \frac{1\ hr.}{3600\ sec} = .23\ hr.$$

STETSON • DALE BANKERS TRUST BUILDING UTICA • NEW YORK • 13501 TEL 315•797•5800 DESIGN BRIEF

PROJECT NAME New York State Dam Inspections DATE

SUBJECT Village of Lake Placid Power Pond Dam PROJECT NO.

Depth - Area - Duration DRAWN BY

Approx. Location of Basin : Long., Lat. = 74°00', 44°20'

PMF

Index Rainfall 16.2" - 200 mi^2, 24 hr.

Duration	% Index	Depth
6 hr	96	15.55
12 hr	108	17.5
24 hr	119	19.28
48 hr	126	20.41

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PROJECT NAME ______ DATE ______

SUBJECT Village of Lake Placid Power Pond Dam PROJECT NO. ______

Spillway Rating Calculations DRAWN BY ______

Ogee crested spillway

$L = 70'$

Design Head $H_d = 4.5'$ (Assumed based on profile of downstream face)

$Q = CLH^{3/2}$

$h/H_d > 1.33$ (h = height of spillway)

C based on discharge head (Fig. 14-4 - Open Channel Hydraulics - Chow)

$C_d = 4.03$

Elev.	H	H/H_d	C/C_d	C	Q
1706	–	–	–	–	0
1707	1	0.22	.795	3.20	224 cfs
1708	2	0.44	.88	3.55	703
1709	3	0.67	.935	3.77	1371
1710	4	0.89	.98	3.95	2212
1711	5	1.11	1.01	4.07	3185
1712	6	1.33	1.02	4.11	4228
1713	7	1.56	1.03	4.15	5380
1714	8	1.78	1.03	4.15	6573
1716	10	2.22	1.03	4.15	9185
1718	12	2.67	1.03	4.15	12,075
1720	14	3.11	1.03	4.15	15,215
1730	24			4.15	34,156

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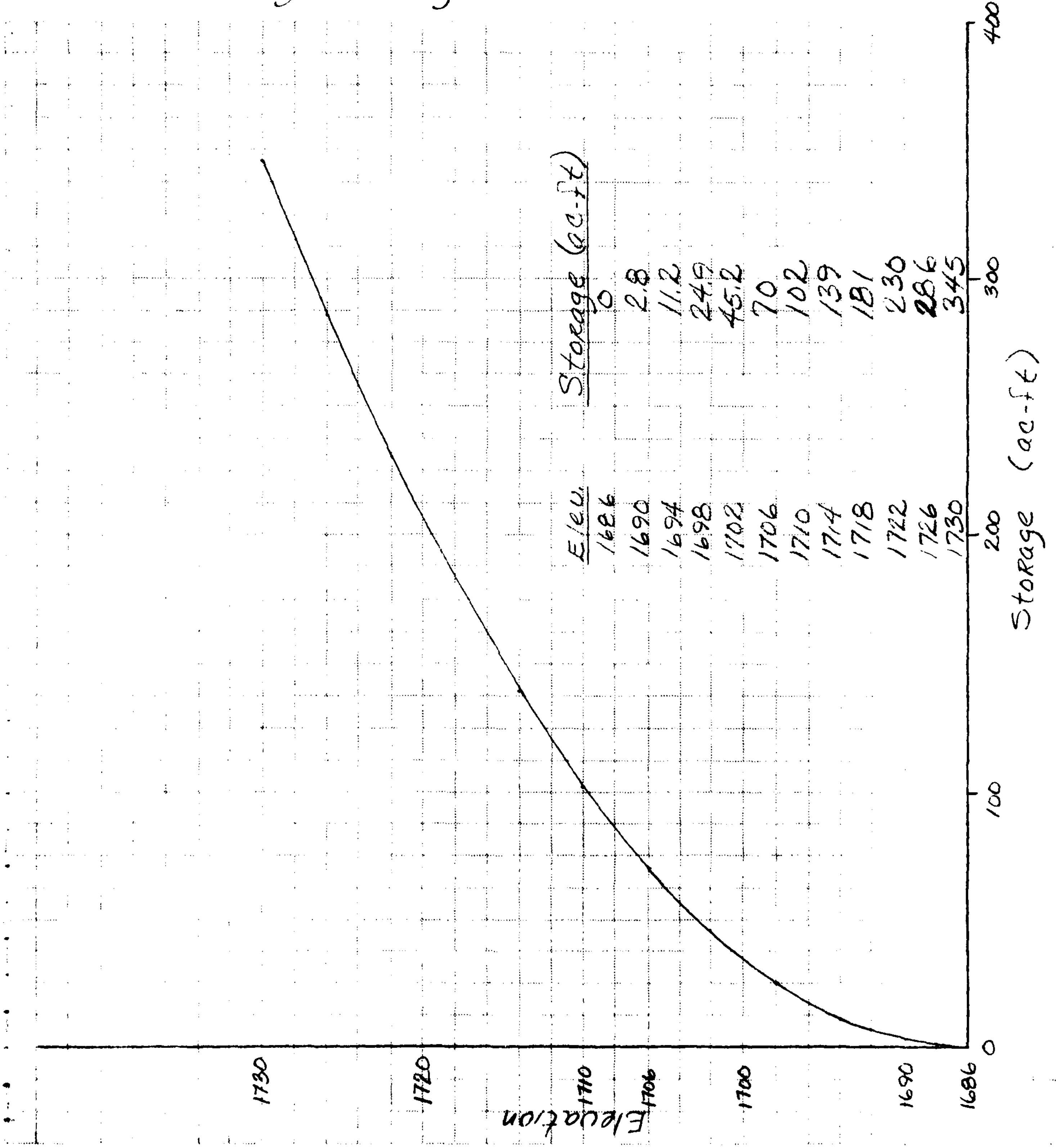
TEL 315-797-5800

PROJECT NAME Village of Lake Placid DATE

SUBJECT Power Pond Dam PROJECT NO.

Stage-Storage Curve DRAWN BY



Elev.	Storage (ac-ft)
1686	0
1690	2.8
1694	11.2
1698	24.9
1702	45.2
1706	70
1710	102
1714	139
1718	181
1722	230
1726	286
1730	345

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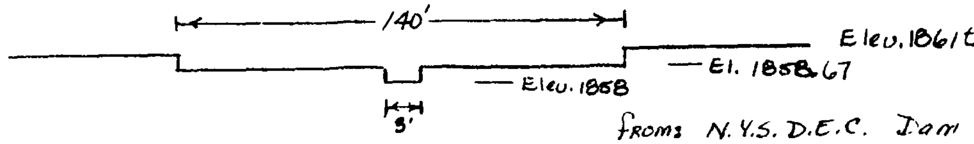
DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections - 1980 DATE

SUBJECT Lake Placid Dam PROJECT NO.

DRAWN BY

Lake Placid Spillway Rating



from N.Y.S. D.E.C. Dam Safety Office

Using $C = 2.65$

$$Q = C H_1 L_1^{3/2} + C H_2 L_2^{3/2}$$

Elev.	H_1	H_2	Q_1	Q_2	Q_{Total}
1858	—	—			0
1859	1	0.33	8	68.8	77 cfs.
1860	2	1.33	22.5	556.9	579
1861	3	2.33	41.3	1291.2	1332
1862	4	3.33	63.6	2206	2270
1863	5	4.33	88.9	3271	3360
1864	6	5.33	117	4467	4585
1865	7	6.33	147	5782	5930
1866	8	7.33	180	7205	7385

Storage Capacity

Elev.	Area (ac)	ΔS (ac-ft)	Σ ΔS (ac-ft)
1858	1990		0
		4240	
1860	2250		4240
		24675	
1870	2685		28915

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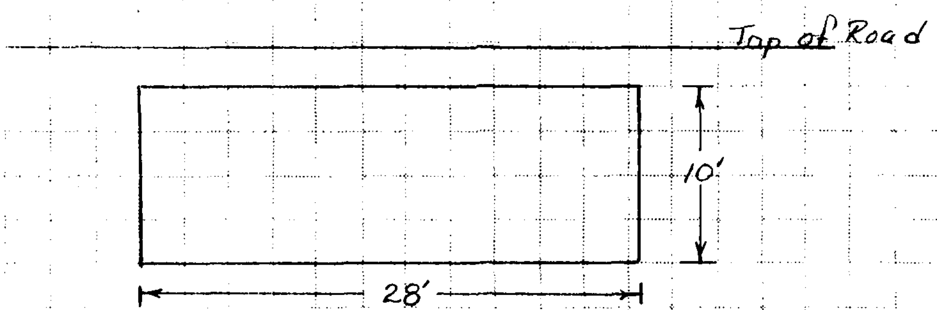
PROJECT NAME ______ DATE ______

SUBJECT ______ PROJECT NO. ______

______ DRAWN BY ______

Stage - Discharge @ Bridge 400' D/S of Dam



Head, Ft.	H/D	Q/W	Q
3	0.3	15	420 cfs
5	0.5	28	785
8	0.8	58	1625
10	1.0	81	2270
12	1.2	105	2940
15	1.5	135	3780
20	2.0	172	4820
30	3.0	235	6580

Flow over Rd. (Elev ~ 1695)

Elev.	H	Q
1695	0	0
1698	3	2125
1703	8	10,975
1708	13	27,600
	18	50,900

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PROJECT NAME ______ DATE ______

SUBJECT ______ PROJECT NO. ______

Stage - Discharge @ Bridge 400'± D/S of Dam ______ DRAWN BY ______

Elev.	Storage (ac-ft)
1683	0
1685	.08
1690	.90
1695	2.8
1700	7.2
1705	14.1
1713	28

Elev.	Q (cfs)	Storage (ac-ft)
1683	0	0
1686	420	0.24
1688	785	0.43
1691	1625	1.2
1693	2270	1.9
1695	2940	2.8
1698	5900	5.1
1703	15,800	11
1708	33,400	19
1713	57,500	29.5

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PROJECT NAME N.Y.S. Dam Inspections - 1980 DATE

SUBJECT Lake Flood - Power Ford Dam PROJECT NO

Reservoir Drain Discharge Rating DRAWN BY

36" waste tube @ invert elev. ~1690.

For H > 1.5 D will act as orifice

$Q = CA\sqrt{2gH}$

C from Table 4-11 "Handbook of Hydraulics" - King & Brater

as "n" values are quite close

$C = 0.77$

$A = \pi R^2 = \pi(1.5')^2 = 7.07 ft^2$

Elev.	H	Q (cfs)
1690	0	0
1695	5	98
1700	10	138
1706	16	175
1710	20	195

```
(0001)  A1      VILLAGE OF LAKE PLACID-POWER POND DAM
(0002)  A2      HEC-1DB (SNYDER'S PARAMETERS)
(0003)  A3      PMF-DAM OVERTOPPING ANALYSIS
(0004)  B     90      1      0      0      0      0      0      0      4
(0005)  B1     5
(0006)  J      1      7      1
(0007)  J1    .2     .3     .4     .5     .6     .8    1.0
(0008)  K      0    100      0      0      0      0      1
(0009)  K1      RUNOFF SUBAREA 1
(0010)  M      1      1   14.0      0   38.3      0      0      0      1
(0011)  P      0   16.2     96    108    119    126
(0012)  T      0      0      0      0      0      0    1.0    0.1      0    .01
(0013)  W    4.5  0.625
(0014)  X    -2.   -0.1    1.0
(0015)  K      1    301      0      0      0      0      1
(0016)  K1      CHANNEL ROUTE THRU SUBAREA 3
(0017)  Y      0      0      0      1      1
(0018)  Y1     1      0      0      0      0      0     -1
(0019)  Y6   .06    .04    .06   1725   1750   5200  .0037
(0020)  Y7   100   1750    380   1730    400   1729    404   1725    422   1725
(0021)  Y7   426   1729    446   1730    650   1750
(0022)  K      0    200      0      0      0      0      1
(0023)  K1      RUNOFF SUBAREA 2
(0024)  M      1      1   20.6      0   38.3      0      0      0      1
(0025)  P      0   16.2     96    108    119    126
(0026)  T      0      0      0      0      0      0    1.0    0.1      0   .153
(0027)  W   2.60  0.625
(0028)  X    -2.   -0.1    1.0
(0029)  K      1    200      0      0      0      0      1
(0030)  K1       ROUTE THRU LAKE PLACID
(0031)  Y      0      0      0      1      1
(0032)  Y1     1      0      0      0      0      0  -1858     -1
(0033)  Y4  1858   1859   1860   1861   1862   1863   1864   1865   1866
(0034)  Y5     0     77    579   1332   2270   3360   4585   5930   7385
(0035)  $S     0   4240  28915
(0036)  $E  1855   1860   1870
(0037)  $$  1858
(0038)  $D  1861    3.0    1.5    150
```

```
(0039)  K       1     302       0       0       0       0       1
(0040)  K1          CHANNEL ROUTE THRU SUBAREA 3
(0041)  Y       0       0       0       1       1
(0042)  Y1      1       0       0       0       0       0      -1
(0043)  Y6    .06     .04     .06    1761    1837   16040  0.0095
(0044)  Y7    100    1667     370    1804     654    1765     660    1781     685    1781
(0045)  Y7    693    1785     838    1804     965    1837
(0046)  K       0     300       0       0       0       0       1
(0047)  K1          RUNOFF SUBAREA 3
(0048)  M       1       1     3.7       0    38.3       0       0       0       1
(0049)  P       0    16.2      96     108     119     126
(0050)  T       0       0       0       0       0       0     1.0     0.1       0   0.075
(0051)  W     2.7   0.625
(0052)  X     -2.    -0.1     1.6
(0053)  K       3     300       0       0       0       0       1
(0054)  K1         COMBINE 3 HYDROGRAPHS - TOTAL INFLOW - @ POWER POND DAM
(0055)  K       1     100       0       0       0       0       1
(0056)  K1         ROUTE OVER POWER POND DAM
(0057)  Y       0       0       0       1       1
(0058)  Y1      1       0       0       0       0       0   -1706      -1
(0059)  Y4   1706    1707    1708    1709    1710    1711    1712    1713    1714    1716
(0060)  Y4   1718    1720    1730
(0061)  Y5      0     224     733    1371    2212    3185    4230    5380    6575    9185
(0062)  Y5  12075   15215   34155
(0063)  $S      0     2.8    11.2    24.9    45.2      70     102     139     181     230
(0064)  $S    286     345
(0065)  $E   1686    1690    1694    1698    1702    1706    1710    1714    1718    1722
(0066)  $E   1726    1730
(0067)  $$   1706
(0068)  $D   1710    2.64     1.5      66
(0069)  K       1      99       0       0       0       0       1
(0070)  K1         ROUTE THRU DOWNSTREAM BRIDGE
(0071)  Y       0       0       0       1       1
(0072)  Y1      1       0       0       0       0       0      -1
(0073)  Y2      0    0.24    0.43     1.2     1.9     2.8     5.1      11      19    29.5
(0074)  Y3      0     420     765    1625    2270    2940    5900   15800   33400   57500
(0075)  Y4   1683    1686    1688    1691    1693    1695    1698    1703    1708    1713
(0076)  Y5      0     420     785    1625    2270    2940    5900   15800   33400   57500
```

```
(0077)  K       1      96       0       0       0       0       1
(0078)  K1        CHANNEL ROUTE TO SUBSTATION - OFFICES OF ELCTRIC CO.
(0079)  Y       0       0       0       1       1
(0080)  Y1      1       0       0       0       0       0      -1
(0081)  Y6  0.060   0.055   0.100    1673    1695     380   0.026
(0082)  Y7    140    1681     260    1680     271    1679     273    1673     290    1673
(0083)  Y7    304    1680     350    1685     367    1695
(0084)  K      99
(0085)  A
(0086)  A
(0087)  A
(0088)  A
(0089)  A
```

```
PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS
          RUNOFF HYDROGRAPH AT            100
          ROUTE HYDROGRAPH TO             301
          RUNOFF HYDROGRAPH AT            200
          ROUTE HYDROGRAPH TO             200
          ROUTE HYDROGRAPH TO             302
          RUNOFF HYDROGRAPH AT            300
          COMBINE  3 HYDROGRAPHS AT       300
          ROUTE HYDROGRAPH TO             100
          ROUTE HYDROGRAPH TO              99
          ROUTE HYDROGRAPH TO              98
          END OF NETWORK
```

```
*********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
*********************************

RUN  DATE WED, AUG 13 1980
     TIME 07:57:50

              VILLAGE OF LAKE PLACID-POWER POND DAM
              HEC-1DB (SNYDER'S PARAMETERS)
              PMF-DAM OVERTOPPING ANALYSIS

                             JOB SPECIFICATION
     NQ      NHR     NMIN     IDAY      IHR     IMIN   METRC     IPLT    IPRT   NSTAN
     9[illegible]      1        0        0        0        0       0        0       4       0
                           JOPER      NWT    LROPT   TRACE
                              5         0        0       0

                     MULTI-PLAN ANALYSES TO BE PERFORMED
                        NPLAN= 1 NRTIO= 7 LRTIO= 1
      RTIOS=   0.20   0.30   0.40   0.50   0.60   0.80   1.00

 **********      **********      **********      **********      **********

                        SUB-AREA RUNOFF COMPUTATION

     RUNOFF SUBAREA 1
              ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME  ISTAGE   IAUTO
               100        0        0        0        0        0        1       0       0

                                HYDROGRAPH DATA
    IHYDG    IUHG    TAREA     SNAP    TRSDA    TRSPC    RATIO    ISNOW    ISAME   LOCAL
       1        1    14.00     0.00    38.30     0.00    0.000        0        1       0

                                  PRECIP DATA
              SPFE      PMS       R6      R12      R24      R48      R72      R96
              0.00    16.20    96.00   108.00   119.00   126.00     0.00     0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.842

                                   LOSS DATA
   LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
      0     0.00    0.00    1.00    0.00    0.00    1.00    1.00    0.10    0.00    0.01

                            UNIT HYDROGRAPH DATA
                      TP=  4.50    CP=0.63    NTA=  0
```

```
                                    RECESSION DATA
                         STRTQ=   -2.00    QRCSN=   -0.10    RTIOR= 1.00

              UNIT HYDROGRAPH 26 END-OF-PERIOD ORDINATES, LAG=   4.50 HOURS, CP= 0.62  VOL= 1.00
          115.      415.      799.     1115.     1240.     1126.      896.      706.      556.      438.
          345.      272.      214.      169.      133.      105.       82.       65.       51.       40.
           32.       25.       20.       15.       12.       10.

       0                                  END-OF-PERIOD FLOW
   MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q       MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q

                                                                           SUM  17.19  13.87   3.32  143714.
                                                                              ( 437.)( 352.)(  84.)( 4069.52)


          **********          **********          **********          **********          **********

                                        HYDROGRAPH ROUTING

                    CHANNEL ROUTE THRU SUBAREA 3
                          ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
                            3-1        1        0        0        0        0        1        0        0
                                                   ROUTING DATA
                    QLOSS    CLOSS      AVG     IRES    ISAME     IOPT     IPMP              LSTR
                      0.0    0.000     0.00        1        1        0        0                 0

                          NSTPS    NSTDL      LAG    AMSKK        X      TSK    STORA   ISPRAT
                              1        0        0    0.000    0.000    0.000      -1.        0


NORMAL DEPTH CHANNEL ROUTING
----------------------------

      QN(1)   QN(2)   QN(3)   ELNVT   ELMAX   RLNTH     SEL
     0.0600  0.0400  0.0600  1725.0  1750.0   5200. 0.00370

      CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
        100.00 1750.00  380.00 1735.00  400.00 1729.00  404.00 1725.00  422.00 1725.00
        426.00 1729.00  446.00 1730.00  650.00 1750.00

STORAGE        0.00       3.03       6.49      10.34      19.17      32.05      50.90      74.76     103.63
             176.36     222.23     269.10     322.97     381.84     445.71     514.59     588.46     667.33

OUTFLOW        0.00      63.95     213.87     405.58     740.28    1285.25    2083.49    3179.35    4614.30
            6655.29   11333.50   14496.10   18175.59   22403.75   27211.39   32628.48   36784.29   45407.39

  STAGE     1725.00    1726.32    1727.63    1728.95    1730.26    1731.58    1732.89    1734.21    1735.53
```

```
              1738.16     1739.47     1740.79     1742.10     1743.42     1744.74     1746.05     1747.37     1748.68

     FLOW        0.00       63.9       203.87      405.5       740.28     1215.25     2083.49     3179.35     4614.30
              5655.29    11333.5     14496.10    18175.59    22403.75    27211.39    32628.48    38684.29    45407.39

MAXIMUM STAGE IS     1733.7

MAXIMUM STAGE IS     1735.

MAXIMUM STAGE IS     1736.1

MAXIMUM STAGE IS     1737.1

MAXIMUM STAGE IS     1737.9

MAXIMUM STAGE IS     1739.3

MAXIMUM STAGE IS     1740.4


          **********          **********          **********          **********          **********

                                   SUB-AREA RUNOFF COMPUTATION

                     RUNOFF SUBAREA 2
                            ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                              200       0       0       0       0       0       1       0       0

                                          HYDROGRAPH DATA
                 IHYDG     IUHG   TAREA     SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                     1        1   20.60     0.00   38.30    0.00   0.000       0       1       0

                                             PRECIP DATA
                         SPFE     PMS      R6      R12     R24     R48     R72     R96
                         0.00   16.20   96.00   108.01  119.00  126.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.842

                                               LOSS DATA
              LROPT    STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
                        0.00    0.00    1.00    0.00    0.00    1.00    1.00    0.10    0.00    0.15

                                          UNIT HYDROGRAPH DATA
                                     TP=  2.60    CP=0.63    NTA=  0

                                             RECESSION DATA
                             STRTQ=   -2.00    QRCSN=   -0.10    RTIOR= 1.60

                  UNIT HYDROGRAPH 14 END-OF-PERIOD ORDINATES, LAG=   2.58 HOURS, CP= 0.63   VOL= 1.00
              664.     2184.     3375.     2568.     1672.     1089.      709.      462.      301.      196.
              128.       83.       54.       35.
```

```
     0
  .DA  HR.MN  PERIOD   RAIN   EXCS   LOSS          END-OF-PERIOD FLOW
                                                   COMP Q      MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q

                                                                                   SUM  17.19  14.55   2.84  236834.
                                                                                      ( 437.)( 365.)(  72.)( 6706.39)


        **********        **********        **********        **********        **********

                                          HYDROGRAPH ROUTING

                         ROUTE THRU LAKE PLACID
                                  ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
                                    200        1        0        0        0        0        1        0        0
                                                          ROUTING DATA
                         QLOSS    CLOSS      AVG     IRES    ISAME     IOPT     IPMP              LSTR
                           0.0    0.000     0.00        1        1        0        0                 0

                                  NSTPS    NSTDL      LAG    AMSKK        X      TSK    STORA   ISPRAT
                                      1        0        0    0.000    0.000    0.000   -1858.       -1

  STAGE      1858.00    1859.00    1860.00    1861.00    1862.00    1863.00    1864.00    1865.00    1866.00

  FLOW          0.00      77.00     579.00    1332.00    2270.00    3360.00    4585.00    5930.00    7385.00

   CAPACITY=       0.      4240.     28915.

  ELEVATION=    1858.      1865.      1870.

                          CREL    SPWID     COQW     EXPW    ELEVL     COQL    CAREA     EXPL
                        1858.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0

                                                   DAM DATA
                                          TOPEL     COQD     EXPD    DAMWID
                                         1861.0      3.0      1.5      150.

 PEAK OUTFLOW IS     301. AT TIME  63.00 HOURS

 PEAK OUTFLOW IS     612. AT TIME  56.00 HOURS

 PEAK OUTFLOW IS     997. AT TIME  52.00 HOURS

 PEAK OUTFLOW IS    1410. AT TIME  50.00 HOURS

 PEAK OUTFLOW IS    2051. AT TIME  49.50 HOURS

 PEAK OUTFLOW IS    3529. AT TIME  48.00 HOURS

 PEAK OUTFLOW IS    5454. AT TIME  47.00 HOURS
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**********          **********          **********          **********          **********

                                   HYDROGRAPH ROUTING

                   CHANNEL ROUTE THRU SUBAREA 3
                       ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
                         3.2        1        0        0        0        0        1        0        0
                                               ROUTING DATA
                   QLOSS   CLOSS      AVG     IRES    ISAME     IOPT     IPMP              LSTR
                     0.0   0.000     0.00        1        1        0        0                 0

                       NSTPS   NSTDL      LAG    AMSKK        X      TSK    STORA   ISPRAT
                           1       0        0    0.000    0.000    0.000      -1.        0


NORMAL DEPTH CHANNEL ROUTING
----------------------------

        QN(1)   QN(2)   QN(3)   ELNVT   ELMAX   RLNTH     SEL
        0.0600  0.0400  0.0600  1781.0  1837.0  16640.  0.00395

        CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
          100.00 1837.00  375.00 1804.00  654.00 1785.00  660.00 1781.00  685.00 1781.00
          693.00 1785.00  970.00 1804.00  965.00 1837.00

  STORAGE        0.00      32.73      88.22     207.31     393.56     646.99     967.59    1355.35    1809.56
              2829.45    3542.7     3965.04    4576.22    5216.33    5855.37    6583.33    7310.22    8066.03

  OUTFLOW        0.00     579.84    2203.83    5555.13   11315.57   20062.55   32390.20   48731.72   70033.53
            155359.2   167293.55  208879.56  255125.06  306093.    361687.56  422532.25  488176.56  558894.00

  STAGE       1781.0     1783.95    1786.89    1789.84    1792.79    1795.74    1798.68    1801.63    1804.58
              1810.47    1813.42    1816.37    1819.31    1822.26    1825.21    1828.16    1831.10    1834.05

  FLOW           0.0      579.84    2203.83    5555.13   11315.57   20062.55   32390.20   48731.72   70033.53
            155359.2   167293.55  208879.56  255125.06  306093.    361687.56  422532.25  488176.56  558894.00

MAXIMUM STAGE IS     1782.5

MAXIMUM STAGE IS     1784.7

MAXIMUM STAGE IS     1784.7

MAXIMUM STAGE IS     1785.5

MAXIMUM STAGE IS     1786.6
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PEAK [illegible] IS      [illegible]6.1

PEAK [illegible] IS      17[illegible].


  **********          **********          **********          **********          **********

                                 SUB-AREA RUNOFF COMPUTATION

           RUNOFF SUBAREA 3
                 ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
                  [illegible]        0        0        0        0        0        1        0        0

                                      HYDROGRAPH DATA
        IHYDG     IUHG    TAREA     SNAP    TRSDA    TRSPC    RATIO    ISNOW    ISAME    LOCAL
           1        1      3.7     0.00    38.30     0.[illegible]0    [illegible].000        0        1        0

                                        PRECIP DATA
                  SPFE      PMS       R6      R12      R24      R48      R72      R96
                  [illegible]     14.2     [illegible]   1[illegible].00   1[illegible]   124.00     0.00     0.00
TRSPC COMPUTED BY THE PROGRAM IS  .842

                                        LOSS DATA
          [illegible]    [illegible]    [illegible]    RTIOL    ERAIN    STRKS    RTIOK    STRTL    CNSTL    ALSMX    RTIMP
                  [illegible]      [illegible]     1.[illegible]     [illegible]     [illegible]     [illegible]     1.00      .10     [illegible]     [illegible]

                                  UNIT HYDROGRAPH DATA
                             TP=  2.7[illegible]     CP= .65     NTA=  0

                                     RECESSION DATA
                        STRTQ=   -2.00     QRCSN=   -0.10     RTIOR= 1.[illegible]

      UNIT HYDROGRAPH [illegible] END-OF-PERIOD ORDINATES, LAG=  [illegible] HOURS, CP= 0.[illegible]  VOL= 1.[illegible]
      .      [illegible]1.     554.     4[illegible].     3[illegible].     [illegible]5.     1[illegible]6.      9[illegible].      5[illegible].      39.
      .      1[illegible].      11.      [illegible].      [illegible].

                                    END-OF-PERIOD FLOW
 [illegible]   .   PERIOD  RAIN   EXCS   LOSS    COMP Q       MO.DA HR.MN PERIOD   RAIN   EXCS   LOSS   COMP Q

                                                                  SUM  17.19  14.[illegible]   3.1[illegible]   41601.
                                                                     ( 437.)( 3[illegible].)( 79.)( 1178.71)


  **********          **********          **********          **********          **********

                                  COMBINE HYDROGRAPHS

           [illegible]   HYDROGRAPH [illegible] - TOTAL I[illegible] - [illegible] POND DAM
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```
        ISTAQ   ICOMP   IECON   ITAPE   JPLT   JPRT   INAME  ISTAGE  IAUTO
          5                                                   1      0

   **********      **********      **********      **********      **********

                                HYDROGRAPH ROUTING

              ROUTE THROUGH RESERVOIR
                 ISTAQ   ICOMP   IECON   ITAPE   JPLT   JPRT   INAME  ISTAGE  IAUTO
                  1.0      1       0       0       0      0      1      0      0
                                        ROUTING DATA
          QLOSS  CLOSS    AVG    IRES   ISAME   IOPT   IPMP          LSTR
           0.0   0.000   0.00     1       1       1      0             0

                 NSTPS   NSTDL    LAG   AMSKK     X     TSK   STORA  ISPRAT
                   1       0       0    0.000   0.000  0.000 -1706.    -1

STAGE    1706.00   1707.00   1708.00   1709.00   1710.00   1711.00   1712.00   1713.00   1714.00
         1715.00   1720.00   1730.00

FLOW        0.       224.      703.     1371.     2212.     3185.00   4230.00   5380.00   6575.00
        12475.    15215.    34155.

CAPACITY=     0.       5.       11.      25.      45.      70.     102.     139.     181.     230.
            260.     345.

ELEVATION=  1680.    1690.    1694.    1698.    1702.    1706.    1710.    1714.    1716.    1722.
            1726.    1730.

                 CREL    SPWID    COQW    EXPW    ELEVL    COQL    CAREA    EXPL
                1706.0    0.0     0.0     0.0      0.0     0.0      0.0      0.0

                                        DAM DATA
                              TOPEL    COQD    EXPD   DAMWID
                              1710.0    2.6     1.5     46.

PEAK OUTFLOW IS     3565. AT TIME  44.00 HOURS

PEAK OUTFLOW IS     5493. AT TIME  44.00 HOURS

PEAK OUTFLOW IS     7463. AT TIME  44.00 HOURS

PEAK OUTFLOW IS     9527. AT TIME  44.00 HOURS

PEAK OUTFLOW IS    11596. AT TIME  44.00 HOURS

PEAK OUTFLOW IS    13937. AT TIME  44.00 HOURS

PEAK OUTFLOW IS    2[illegible]. AT TIME  44.00 HOURS
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AD-A090 939 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. LAKE PLACID VILLAGE DAM. (INVENTOR--ETC(U)
SEP 80 J B STETSON DACW51-79-C-0001

UNCLASSIFIED NL

2 of 2

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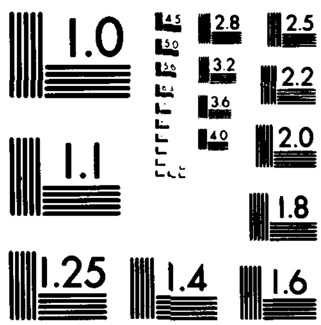

MICROCOPY RESOLUTION TEST CHART

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**********          **********          **********          **********          **********

                                     HYDROGRAPH ROUTING

                  ROUTE THRU DOWNSTREAM BRIDGE
                           ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                              99       1       0       0       0       0       1       0       0
                                                  ROUTING DATA
                  QLOSS    CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
                    0.0    0.000    0.00       1       1       0       0               0

                           NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                               1       0       0   0.000   0.000   0.000     -1.       0

 STORAGE      0.00      0.24      0.43      1.20      1.90      2.80      5.10     11.00     19.00

 OUTFLOW      0.0     420.00    785.00   1625.00   2270.00   2940.00   5900.00  15000.00  33400.00

   STAGE   1653.00   1666.00   1688.00   1691.00   1693.00   1695.00   1698.00   1703.00   1708.00

    FLOW      0.00    420.00    785.00   1625.00   2270.00   2940.00   5900.00  15000.00  33400.00

MAXIMUM STAGE IS    1695.0

MAXIMUM STAGE IS    1697.6

MAXIMUM STAGE IS    1698.8

MAXIMUM STAGE IS    1699.8

MAXIMUM STAGE IS    1700.9

MAXIMUM STAGE IS    1703.0

MAXIMUM STAGE IS    1704.4


**********          **********          **********          **********          **********

                                     HYDROGRAPH ROUTING

                  CHANNEL ROUTE TO SUBSTATION - OFFICES OF ELCTRIC CO.
                           ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                              98       1       0       0       0       0       1       0       0
                                                  ROUTING DATA
                  QLOSS    CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
                    0.0    0.000    0.00       1       1       0       0               0
```

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0650	0.0550	0.1000	1673.0	1695.0	380.	0.02600

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
140.00 1681.00 260.00 1680.00 271.00 1679.00 273.00 1673.00 290.00 1673.00
304.00 1680.00 350.00 1685.00 367.00 1695.00

STORAGE	0.00	0.19	0.40	0.64	0.91	1.20	1.56	2.69	4.50
	8.45	10.57	12.71	14.87	17.06	19.26	21.48	23.73	25.99
OUTFLOW	0.00	94.09	300.62	599.56	987.85	1466.35	2081.47	3164.09	5303.50
	11945.06	16357.94	21434.48	27113.14	33364.60	40165.68	47497.41	55344.00	63691.93
STAGE	1673.00	1674.16	1675.32	1676.47	1677.63	1678.79	1679.95	1681.10	1682.26
	1684.58	1685.73	1686.89	1688.05	1689.21	1690.37	1691.52	1692.68	1693.84
FLOW	0.00	94.09	300.62	599.56	987.85	1466.35	2081.47	3164.09	5303.50
	11945.06	16357.94	21434.48	27113.14	33364.60	40165.68	47497.41	55344.00	63691.93

MAXIMUM STAGE IS 1681.3

MAXIMUM STAGE IS 1682.3

MAXIMUM STAGE IS 1683.1

MAXIMUM STAGE IS 1683.7

MAXIMUM STAGE IS 1684.5

MAXIMUM STAGE IS 1685.6

MAXIMUM STAGE IS 1686.7

********** ********** ********** ********** **********

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1 0.20	RATIO 2 0.30	RATIO 3 0.40	RATIO 4 0.50	RATIO 5 0.60	RATIO 6 0.80	RATIO 7 1.00
				RATIOS APPLIED TO FLOWS						
HYDROGRAPH AT	[illegible]	14.00	1	2742.	4114.	5485.	6856.	8227.	10970.	13712.
	(	36.26)	(	77.66)(	116.49)(	155.31)(	194.14)(	232.97)(	310.63)(	388.28)(
ROUTED TO	301	14.00	1	2719.	4084.	5454.	6820.	8183.	10918.	13657.
	(	36.26)	(	77.01)(	115.66)(	154.43)(	193.12)(	231.71)(	309.15)(	386.73)(
HYDROGRAPH AT	[illegible]	20.60	1	5756.	8634.	11512.	14390.	17268.	23025.	28781.
	(	53.35)	(	163.00)(	244.49)(	325.99)(	407.49)(	488.99)(	651.98)(	814.98)(
ROUTED TO	[illegible]	20.60	1	301.	612.	997.	1410.	2051.	3629.	5454.
	(	53.35)	(	8.52)(	17.33)(	28.22)(	39.92)(	58.08)(	102.76)(	154.45)(
ROUTED TO	302	20.60	1	301.	612.	997.	1409.	2046.	3616.	5453.
	(	53.35)	(	8.52)(	17.33)(	28.22)(	39.90)(	57.94)(	102.38)(	154.41)(
HYDROGRAPH AT	[illegible]	3.70	1	1007.	1510.	2014.	2517.	3021.	4027.	5034.
	(	9.58)	(	28.51)(	42.77)(	57.02)(	71.28)(	85.53)(	114.05)(	142.56)(
3 COMBINED	[illegible]	38.30	1	3557.	5487.	7462.	9520.	11596.	15948.	20695.
	(	99.20)	(	100.72)(	155.39)(	211.31)(	269.59)(	328.37)(	451.59)(	586.02)(
ROUTED TO	100	38.30	1	3563.	5493.	7467.	9520.	11596.	15937.	20686.
	(	99.20)	(	100.90)(	155.53)(	211.45)(	269.58)(	328.36)(	451.27)(	585.75)(
ROUTED TO	99	38.30	1	3557.	5501.	7463.	9515.	11597.	15940.	20673.
	(	99.20)	(	100.72)(	155.78)(	211.34)(	269.43)(	328.39)(	451.38)(	585.38)(
ROUTED TO	98	38.30	1	3554.	5507.	7466.	9514.	11593.	15938.	20671.
	(	99.20)	(	100.63)(	155.95)(	211.42)(	269.41)(	328.29)(	451.31)(	585.33)(

PLAN 1 STATION 301

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	2719.	1733.7	44.00
0.30	4084.	1735.0	44.00

0.40	5454.	1736.1	44.00
0.50	6820.	1737.1	44.00
0.60	8183.	1737.9	44.00
0.80	10916.	1739.3	44.00
1.00	13657.	1740.4	44.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1858.00	1858.00	1861.00
STORAGE	0.	0.	6707.
OUTFLOW	0.	0.	1332.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	1859.45	0.00	3066.	301.	0.00	63.00	0.00
0.30	1860.04	0.00	4348.	612.	0.00	56.00	0.00
0.40	1860.55	0.00	5609.	997.	0.00	52.00	0.00
0.50	1861.07	0.07	6889.	1410.	13.00	50.00	0.00
0.60	1861.56	0.56	8098.	2051.	29.00	49.00	0.00
0.80	1862.49	1.49	10392.	3629.	44.00	48.00	0.00
1.00	1863.37	2.37	12555.	5454.	49.00	48.00	0.00

PLAN 1 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	301.	1782.5	64.00
0.30	612.	1784.0	57.00
0.40	997.	1784.7	53.00
0.50	1409.	1785.5	51.00
0.60	2046.	1786.6	49.00
0.80	3616.	1788.1	49.00
1.00	5453.	1789.8	48.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1706.00	1706.00	1710.00
STORAGE	70.	70.	102.
OUTFLOW	0.	0.	2212.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	1711.16	1.16	113.	3563.	6.00	44.00	0.00
0.30	1712.50	2.50	125.	5493.	10.00	44.00	0.00
0.40	1713.71	3.71	136.	7467.	13.00	44.00	0.00
0.50	1714.84	4.84	148.	9520.	17.00	44.00	0.00
0.60	1715.92	5.92	159.	11596.	28.00	44.00	0.00
0.80	1717.96	7.96	181.	15937.	39.00	44.00	0.00
1.00	1719.98	9.98	205.	20686.	46.00	44.00	0.00

PLAN 1 STATION 99

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	3557.	1695.6	44.00
0.30	5501.	1697.6	44.00
0.40	7463.	1698.8	44.00
0.50	9515.	1699.8	44.00
0.60	11597.	1700.9	44.00
0.80	15940.	1703.0	44.00
1.00	20673.	1704.4	44.00

PLAN 1 STATION 98

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	3554.	1681.3	44.00
0.30	5507.	1682.3	44.00
0.40	7466.	1683.1	44.00
0.50	9514.	1683.8	44.00
0.60	11593.	1684.5	44.00
0.80	15938.	1685.6	44.00
1.00	20671.	1686.7	44.00

```
(0001)  A1      VILLAGE OF LAKE PLACID-POWER POND DAM
(0002)  A2      HEC-1DB (SNYDER'S PARAMETERS)
(0003)  A3      0.5 PMF DAMBREAK ANALYSIS
(0004)  B     300       0      10       0       0       0       0       0       4
(0005)  B1      5
(0006)  J       3       1       1
(0007)  J1    0.5
(0008)  K       0     100       0       0       0       0       1
(0009)  K1      RUNOFF SUBAREA 1
(0010)  M       1       1    14.0       0    38.3       0       0       0       1
(0011)  P       0    16.2      96     108     119     126
(0012)  T       0       0       0       0       0       0     1.0     0.1       0     .01
(0013)  W     4.5   0.625
(0014)  X     -2.    -0.1     1.6
(0015)  K       1     301       0       0       0       0       1
(0016)  K1      CHANNEL ROUTE THRU SUBAREA 3
(0017)  Y       0       0       0       1       1
(0018)  Y1      1       0       0       0       0       0      -1
(0019)  Y6    .06     .04     .06    1725    1750    5200   .0037
(0020)  Y7    100    1750     380    1730     400    1729     404    1725     422    1725
(0021)  Y7    426    1729     446    1730     650    1750
(0022)  K       0     200       0       0       0       0       1
(0023)  K1      RUNOFF SUBAREA 2
(0024)  M       1       1    20.6       0    38.3       0       0       0       1
(0025)  P       0    16.2      96     108     119     126
(0026)  T       0       0       0       0       0       0     1.0     0.1       0    .153
(0027)  W    2.60   0.625
(0028)  X     -2.    -0.1     1.6
(0029)  K       1     200       0       0       0       0       1
(0030)  K1       ROUTE THRU LAKE PLACID
(0031)  Y       0       0       0       1       1
(0032)  Y1      1       0       0       0       0       0   -1858      -1
(0033)  Y4   1858    1859    1860    1861    1862    1863    1864    1865    1866
(0034)  Y5      0      77     579    1332    2270    3360    4585    5930    7385
(0035)  $S      0    4240   28915
(0036)  $E   1858    1860    1876
(0037)  $$   1858
(0038)  $D   1861     3.0     1.5     150
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(0039)  K       1     302       0       0       0       0       1
(0040)  K1          CHANNEL ROUTE THRU SUBAREA 3
(0041)  Y       0       0       0       1       1
(0042)  Y1      1       0       0       0       0       0      -1
(0043)  Y6    .06     .04     .06    1781    1837   16040  0.0095
(0044)  Y7    100    1867     370    1804     654    1785     660    1781     685    1781
(0045)  Y7    693    1785     808    1804     965    1837
(0046)  K       0     300       0       0       0       0       1
(0047)  K1          RUNOFF SUBAREA 3
(0048)  M       1       1     3.7       0    38.3       0       0       0       1
(0049)  F       0    16.2      96     108     119     126
(0050)  T       0       0       0       0       0       0     1.0     0.1       0   0.075
(0051)  W     2.7   0.625
(0052)  X     -2.    -0.1     1.6
(0053)  K       3     300       0       0       0       0       1
(0054)  K1         COMBINE 3 HYDROGRAPHS - TOTAL INFLOW - @ POWER POND DAM
(0055)  K       1     100       0       0       0       0       1
(0056)  K1         ROUTE OVER POWER POND DAM
(0057)  Y       0       0       0       1       1
(0058)  Y1      1       0       0       0       0       0   -1706      -1
(0059)  Y4   1706    1707    1708    1709    1710    1711    1712    1713    1714    1716
(0060)  Y4   1718    1720    1730
(0061)  Y5      0     224     703    1371    2212    3185    4230    5380    6575    9185
(0062)  Y5  12075   15215   34155
(0063)  $S      0     2.8    11.2    24.9    45.2      70     102     139     181     230
(0064)  $S    286     345
(0065)  $E   1686    1690    1694    1698    1702    1706    1710    1714    1718    1722
(0066)  $E   1726    1730
(0067)  $$   1706
(0068)  $D   1710    2.64     1.5      66
(0069)  $B     70       0    1687     0.1    1706  1714.8
(0070)  $B     70       0    1687     0.3    1706  1714.8
(0071)  $B     70       0    1687     0.5    1706  1714.8
(0072)  K       1      99       0       0       0       0       1
(0073)  K1         ROUTE THRU DOWNSTREAM BRIDGE
(0074)  Y       0       0       0       1       1
(0075)  Y1      1       0       0       0       0       0      -1
(0076)  Y2      0    0.24    0.43     1.2     1.9     2.8     5.1      11      19    29.5
```

```
(0077)  Y3      0     420     785    1625    2270    2940    5900   15800   33400   57500
(0078)  Y4   1683    1686    1688    1691    1693    1695    1698    1703    1708    1713
(0079)  Y5      0     420     785    1625    2270    2940    5900   15800   33400   57500
(0080)  K       1      98       0       0       0       2       1
(0081)  K1        CHANNEL ROUTE TO SUBSTATION - OFFICES OF ELCTRIC CO.
(0082)  Y       0       0       0       1       1
(0083)  Y1      1       0       0       0       0       0      -1
(0084)  Y6  0.060   0.055   0.100    1673    1695     380   0.026
(0085)  Y7    140    1681     260    1680     271    1679     273    1673     290    1673
(0086)  Y7    304    1680     350    1685     367    1695
(0087)  K      99
(0088)  A
(0089)  A
(0090)  A
(0091)  A
(0092)  A
```

```
PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS
         RUNOFF HYDROGRAPH AT          100
         ROUTE HYDROGRAPH TO           301
         RUNOFF HYDROGRAPH AT          200
         ROUTE HYDROGRAPH TO           200
         ROUTE HYDROGRAPH TO           302
         RUNOFF HYDROGRAPH AT          300
         COMBINE  3 HYDROGRAPHS AT     300
         ROUTE HYDROGRAPH TO           100
         ROUTE HYDROGRAPH TO            99
         ROUTE HYDROGRAPH TO            98
         END OF NETWORK
```

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********************************

RUN  DATE?WED, AUG 13 1980
     TIME?11:03:17

                     VILLAGE OF LAKE PLACID-POWER POND DAM
                     HEC-1DB (SNYDER'S PARAMETERS)
                     0.5 PMF DAMBREAK ANALYSIS

                                JOB SPECIFICATION
              NQ     NHR    NMIN    IDAY     IHR    IMIN   METRC    IPLT    IPRT   NSTAN
             300       0      10       0       0       0       0       0       4       0
                                    JOPER     NWT   LROPT   TRACE
                                        5       0       0       0

                           MULTI-PLAN ANALYSES TO BE PERFORMED
                              NPLAN= 3 NRTIO= 1 LRTIO= 1
               RTIOS=   0.50

       **********          **********          **********          **********          **********

                              SUB-AREA RUNOFF COMPUTATION

                RUNOFF SUBAREA 1
                     ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                       100       0       0       0       0       0       1       0       0

                                    HYDROGRAPH DATA
              IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                  1       1   14.00    0.00   38.30    0.00   0.000       0       1       0

                                     PRECIP DATA
                       SPFE     PMS      R6     R12     R24     R48     R72     R96
                       0.00   16.20   96.00  108.00  119.00  126.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.842

                                      LOSS DATA
           LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
               0    0.00    0.00    1.00    0.00    0.00    1.00    1.00    0.10    0.00    0.01

                                  UNIT HYDROGRAPH DATA
```

```
                         TP=  4.50    CP=0.63    NTA=  0

                                    RECESSION DATA
                     STRTG=    -2.00    QRCSN=   -0.10    RTIOR= 1.60

          UNIT HYDROGRAPH 50 END-OF-PERIOD ORDINATES, LAG=   4.49 HOURS, CP= 0.63  VOL= 0.97
       10.       36.       75.      121.      173.      230.      291.      355.      421.      491.
      562.      634.      706.      783.      859.      932.      999.     1059.     1113.     1161.
     1201.     1236.     1264.     1285.     1299.     1306.     1306.     1296.     1275.     1236.
     1186.     1142.     1098.     1055.     1014.      974.      936.      900.      864.      831.
      798.      767.      737.      708.      681.      654.      629.      604.      581.      558.
      536.      515.      495.      476.      457.      439.      422.      406.      390.      375.
      360.      346.      333.      320.      307.      295.      284.      273.      262.      252.
      242.      233.      223.      215.      206.      198.      191.      183.      176.      169.
      163.      156.      150.      144.      139.      133.      128.      123.      118.      114.
      109.      105.      101.       97.       93.       89.       86.       83.       79.       76.

                                    END-OF-PERIOD FLOW
 MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q      MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q

                                                                    SUM  17.19  13.87   3.32  641583.
                                                                       ( 437.)( 352.)(  84.)(18167.59)


          **********          **********          **********          **********          **********

                                    HYDROGRAPH ROUTING

                CHANNEL ROUTE THRU SUBAREA 3
                     ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                       301       1       0       0       0       0       1       0       0

                                    ALL PLANS HAVE SAME
                                       ROUTING DATA
                QLOSS    CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
                  0.0    0.000    0.00       1       1       0       0               0

                     NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                         1       0       0   0.000   0.000   0.000     -1.       0


NORMAL DEPTH CHANNEL ROUTING
----------------------------

     QN(1)   QN(2)   QN(3)   ELNVT   ELMAX   RLNTH     SEL
    0.0600  0.0400  0.0600  1725.0  1750.0   5200. 0.00370

     CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
```

```
         100.00 1730.00  3..0. 1730.00  450.00 1729.00  4 4.00 1725.00  422.00 1725.00
         426.00 1729.00  446.0. 1730.3.  650.00 1750.0.

 STORAGE       0.00      3.95      6.48     10.34     12.17     32.03     50.90     74.76    103.63
             176.36    220.23    269.10    322.97    381.84    445.71    514.59    588.46    667.33

 OUTFLOW       0.00     63.93    203.87    405.58    740.26   1285.25   2083.49   3179.35   4614.30
            8655.29  11333.58  14496.10  18175.59  22403.75  27211.39  32628.48  38684.29  45407.39

   STAGE    1725.00   1726.32   1727.63   1728.95   1730.26   1731.58   1732.89   1734.21   1735.53
            1738.16   1739.47   1740.79   1742.10   1743.42   1744.74   1746.05   1747.37   1748.68

    FLOW       0.00     63.93    203.87    405.58    740.28   1285.25   2083.49   3179.35   4614.30
            8655.29  11333.58  14496.10  18175.59  22403.75  27211.39  32628.48  38684.29  45407.39

MAXIMUM STAGE IS     1737.2

MAXIMUM STAGE IS     1737.2

MAXIMUM STAGE IS     1737.2


          **********        **********        **********        **********        **********

                                     SUB-AREA RUNOFF COMPUTATION

                    RUNOFF SUBAREA 2
                               ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
                                 200        0        0        0        0        0        1        0        0

                                              HYDROGRAPH DATA
                 IHYDG     IUHG    TAREA     SNAP    TRSDA    TRSPC    RATIO    ISNOW    ISAME    LOCAL
                     1        1    20.60     0.00    38.30     0.00    0.000        0        1        0

                                                PRECIP DATA
                         SPFE      PMS       R6      R12      R24      R48      R72      R96
                         0.00    16.20    96.00   108.00   119.00   126.00     0.00     0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.842

                                                 LOSS DATA
             LROPT    STRKR    DLTKR    RTIOL    ERAIN    STRKS    RTIOK    STRTL    CNSTL    ALSMX    RTIMP
                 0     0.00     0.00     1.00     0.00     0.00     1.00     1.00     0.10     0.00     0.15

                                              UNIT HYDROGRAPH DATA
                                         TP=  2.60      CP=0.63     NTA=  0

                                                 RECESSION DATA
                              STRTQ=    -2.00     QRCSN=    -0.10     RTIOR= 1.60

                 UNIT HYDROGRAPH 66 END-OF-PERIOD ORDINATES, LAG=   2.58 HOURS, CP= 0.63  VOL= 1.00
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```
        54.     203.     415.     665.     943.    1240.    1552.    1875.    2202.    2508.
      2763.    2778.    3140.    3253.    3314.    3319.    3252.    3090.    2883.    2689.
      2509.    2340.    2133.    2037.    1903.    1772.    1654.    1543.    1439.    1342.
      1252.    1168.    1090.    1017.     949.     885.     825.     770.     718.     670.
       625.     583.     544.     508.     474.     442.     412.     384.     359.     335.
       312.     291.     272.     253.     236.     221.     206.     192.     179.     167.
       156.     145.     136.     126.     118.     110.     103.      96.      89.      83.
        78.      73.      68.      63.      59.      55.      51.      48.      45.      42.
        39.      36.      34.      32.      29.      27.

   C                                    END-OF-PERIOD FLOW
 MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q      MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q
                                                                  SUM  17.19   16.35    2.84  1111982.
                                                                      ( 437.)( 385.)(  72.)(31487.79)


         **********        **********        **********        **********        **********

                                        HYDROGRAPH ROUTING

                      ROUTE THRU LAKE PLACID
                           ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                             200       1       0       0       0       0       1       0       0

                                        ALL PLANS HAVE SAME
                                           ROUTING DATA
                      QLOSS    CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
                        0.0    0.000    0.00       1       1       0       0               0

                           NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                               1       0       0   0.000   0.000   0.000  -1858.      -1

 STAGE      1858.00     1859.00     1860.00     1861.00     1862.00     1863.00     1864.00     1865.00     1866.00

  FLOW         0.00       77.00      579.00     1332.00     2270.00     3360.00     4585.00     5930.00     7385.00

   CAPACITY=         0.      4240.     28915.

  ELEVATION=      1858.      1860.      1870.

                          CREL   SPWID   COQW   EXPW   ELEVL   COQL   CAREA   EXPL
                        1855.0     0.0    0.0    0.0     0.0    0.0     0.0    0.0

                                              DAM DATA
                                      TOPEL    COQD    EXPD  DAMWID
                                     1861.0     3.0     1.5    150.

 PEAK OUTFLOW IS     1374. AT TIME  49.50 HOURS

 PEAK OUTFLOW IS     1374. AT TIME  49.50 HOURS
```

PEAK OUTFLOW IS 1374. AT TIME 49.50 HOURS

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CHANNEL ROUTE THRU SUBAREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
302	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME
ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0600	0.0400	0.0600	1781.0	1837.0	16040.	0.00950

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 1867.00 370.00 1804.00 654.00 1785.00 660.00 1781.00 685.00 1781.00
693.00 1785.00 808.00 1804.00 965.00 1837.00

STORAGE	0.00	32.73	86.22	207.31	393.56	646.99	967.59	1355.35	1809.56
	2829.45	3382.72	3985.04	4576.22	5216.33	5885.37	6583.33	7310.22	8066.05
OUTFLOW	0.00	579.84	2203.83	5555.13	11315.57	20082.55	32390.20	48731.72	70033.53
	130309.20	167293.53	208879.56	255123.06	306093.00	361867.56	422532.25	488176.56	558894.00
STAGE	1781.00	1783.95	1786.89	1789.84	1792.79	1795.74	1798.68	1801.63	1804.58
	1810.47	1813.42	1816.37	1819.31	1822.26	1825.21	1828.16	1831.10	1834.05
FLOW	0.00	579.84	2203.83	5555.13	11315.57	20082.55	32390.20	48731.72	70033.53
	130309.20	167293.53	208879.56	255123.06	306093.00	361867.56	422532.25	488176.56	558894.00

MAXIMUM STAGE IS 1785.4

MAXIMUM STAGE IS 1785.4

MAXIMUM STAGE IS 1785.4

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**********          **********          **********          **********          **********

                              SUB-AREA RUNOFF COMPUTATION

            RUNOFF SUBAREA 3
                   ISTAQ   ICOMP   IECON   ITAPE   JPLT   JPRT   INAME  ISTAGE  IAUTO
                    3 0       0       0       0      0      0      1      0      0

                                      HYDROGRAPH DATA
         IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME  LOCAL
             1       1    3.70    0.00   38.30    0.00   0.000       0       1      0

                                       PRECIP DATA
                 SPFE     PMS      R6     R12     R24     R48     R72     R96
                 0.00   16.20   96.00  108.00  119.00  126.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.842

                                        LOSS DATA
       LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
                0.00    0.00    1.00    0.00    0.00    1.00    1.00    0.10    0.00    0.07

                                  UNIT HYDROGRAPH DATA
                             TP=  2.70     CP=0.63    NTA=  0

                                      RECESSION DATA
                      STRTQ=   -2.00    QRCSN=   -0.10    RTIOR= 1.60

        UNIT HYDROGRAPH 90 END-OF-PERIOD ORDINATES, LAG=  2.72 HOURS, CP= 0.63  VOL= 1.00
           9.       33.       67.      107.      152.      200.      251.      303.      357.      409.
         455.      494.      525.      548.      563.      570.      567.      552.      522.      489.
         458.      428.      401.      375.      351.      329.      308.      288.      270.      252.
         236.      221.      207.      194.      181.      170.      159.      149.      139.      130.
         122.      114.      107.      100.       93.       87.       82.       77.       72.       67.
          63.       59.       55.       52.       48.       45.       42.       40.       37.       35.
          32.       30.       28.       27.       25.       23.       22.       20.       19.       18.
          17.       16.       15.       14.       13.       12.       11.       11.       10.        9.
           9.        8.        8.        7.        7.        6.        6.        5.        5.        5.

     0                                    END-OF-PERIOD FLOW
 MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q     MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q

                                                                     SUM  17.19  14.09   3.10   195129.
                                                                        ( 437.)( 358.)(  79.)( 5525.43)


**********          **********          **********          **********          **********

                                 COMBINE HYDROGRAPHS
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                 COMBINE 3 HYDROGRAPHS - TOTAL INFLOW - @ POWER POND DAM
                           ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
                             300        3        0        0        0        0        1        0        0

      **********       **********       **********       **********       **********

                                          HYDROGRAPH ROUTING

                 ROUTE OVER POWER POND DAM
                           ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
                             100        1        0        0        0        0        1        0        0

                                          ALL PLANS HAVE SAME
                                              ROUTING DATA
                 QLOSS     CLOSS      AVG     IRES    ISAME     IOPT     IPMP              LSTR
                   0.0     0.000     0.00        1        1        0        0                 0

                           NSTPS    NSTDL      LAG    AMSKK        X      TSK    STORA   ISPRAT
                               1        0        0    0.000    0.000    0.000   -1706.       -1

 STAGE     1706.00    1707.00    1708.00    1709.00    1710.00    1711.00    1712.00    1713.00    1714.00
           1716.00    1720.00    1730.00

  FLOW        0.00     224.00     703.00    1371.00    2212.00    3185.00    4230.00    5380.00    6575.00
          12075.00   15215.00   34155.00

  CAPACITY=      0.        3.       11.       25.       45.       70.      102.      139.      181.      230.
               286.      345.

 ELEVATION=   1686.     1690.     1694.     1698.     1702.     1706.     1710.     1714.     1718.     1722.
              1726.     1730.

                      CREL    SPWID    COQW    EXPW    ELEVL    COQL    CAREA    EXPL
                    1706.0      0.0     0.0     0.0      0.0     0.0      0.0     0.0

                                               DAM DATA
                                      TOPEL    COQD    EXPD   DAMWID
                                     1710.0     2.6     1.5      66.

                                             DAM BREACH DATA
                               BRWID        Z    ELBM    TFAIL     WSEL   FAILEL
                                 70.     0.00 1687.00     0.10  1706.00  1714.80

BEGIN DAM FAILURE AT 43.17 HOURS

PEAK OUTFLOW IS    21328. AT TIME  43.27 HOURS

                                             DAM BREACH DATA
                               BRWID        Z    ELBM    TFAIL     WSEL   FAILEL
```

```
                                    70.     0.00 1687.00    0.33 1706.00 1714.80

BEGIN DAM FAILURE AT 43.17 HOURS

PEAK OUTFLOW IS    15003. AT TIME  43.46 HOURS

                                               DAM BREACH DATA
                                   BRWID          Z    ELBM    TFAIL    WSEL  FAILEL
                                     70.       0.00 1687.00    0.50 1706.00 1714.80

BEGIN DAM FAILURE AT 43.17 HOURS

PEAK OUTFLOW IS    13991. AT TIME  43.67 HOURS


          **********          **********          **********          **********          **********

                                        HYDROGRAPH ROUTING

                        ROUTE THRU DOWNSTREAM BRIDGE
                              ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
                                 99        1        0        0        0        0        1        0        0

                                                ALL PLANS HAVE SAME
                                                    ROUTING DATA
                        QLOSS    CLOSS      AVG     IRES    ISAME     IOPT     IPMP              LSTR
                          0.0    0.000     0.00        1        1        0        0                 0

                              NSTPS    NSTOL      LAG    AMSKK        X      TSK    STORA   ISPRAT
                                  1        0        0    0.000    0.000    0.000      -1.        0

 STORAGE       0.00      0.24      0.45      1.20      1.90      2.80      5.10     11.00     19.00

 OUTFLOW       0.00    420.00    785.00   1625.00   2270.00   2940.00   5900.00  15800.00  33400.00

   STAGE    1683.00   1686.00   1688.00   1691.00   1693.00   1695.00   1698.00   1703.00   1708.00

    FLOW       0.00    420.00    785.00   1625.00   2270.00   2940.00   5900.00  15800.00  33400.00

MAXIMUM STAGE IS    1701.5

MAXIMUM STAGE IS    1701.6

MAXIMUM STAGE IS    1701.6


          **********          **********          **********          **********          **********

                                        HYDROGRAPH ROUTING
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CHANNEL ROUTE TO SUBSTATION - OFFICES OF ELCTRIC CO.
             ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                98       1       0       0       0       2       1       0       0

                                 ALL PLANS HAVE SAME
                                    ROUTING DATA
     QLOSS   CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
       0.0   0.000    0.00       1       1       0       0               0

             NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                 1       0       0   0.000   0.000   0.000     -1.       0


NORMAL DEPTH CHANNEL ROUTING
----------------------------

  QN(1)   QN(2)   QN(3)   ELNVT   ELMAX   RLNTH      SEL
  .0600  0.0550  0.1000  1673.0  1695.0    380.  0.02630

  CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
   140.00 1681.00  260.00 1680.00  271.00 1679.00  273.00 1673.00  290.00 1673.00
   304.00 1680.00  350.00 1685.00  367.00 1695.00

STORAGE      0.00      0.19      0.40      0.64      0.91      1.20      1.56      2.69      4.50
             8.45     10.57     12.71     14.87     17.06     19.26     21.48     23.73     25.99

OUTFLOW      0.00     94.09    300.62    599.56    987.63   1466.35   2081.47   3164.09   5303.50
         11945.08  16357.94  21434.48  27113.14  33364.60  40165.68  47497.41  55344.00  63691.93

  STAGE   1673.00   1674.16   1675.32   1676.47   1677.63   1678.79   1679.95   1681.10   1682.26
          1684.58   1685.73   1686.89   1688.05   1689.21   1690.37   1691.52   1692.68   1693.84

   FLOW      0.00     94.09    300.62    599.56    987.85   1466.35   2081.47   3164.09   5303.50
         11945.08  16357.94  21434.48  27113.14  33364.60  40165.68  47497.41  55344.00  63691.93

                           STATION     98, PLAN 1, RTIO 1

                                      OUTFLOW
           5.        8.       11.       13.       14.       14.       14.       14.       14.       14.
          13.       13.       12.       12.       11.       11.       11.       10.       10.        9.
           9.        8.        8.        8.        7.        7.        7.        7.        6.        6.
           6.        6.        5.        5.        5.        5.        5.        4.        4.        4.
           4.        4.        4.        4.        3.        3.        3.        3.        3.        3.
           3.        3.        3.        3.        3.        3.        3.        3.        3.        3.
           3.        3.        3.        3.        3.        2.        2.        2.        2.        2.
           2.        2.        2.        2.        2.        2.        2.        2.        2.        3.
           3.        3.        3.        3.        3.        3.        4.        4.        4.        4.
           5.        5.        5.        6.        6.        7.        7.        8.        8.        9.
```

[illegible]	10.	11.	12.	12.	13.	13.	14.	14.	15.
15.	15.	14.	16.	16.	16.	16.	15.	15.	15.
15.	14.	14.	14.	13.	13.	13.	12.	12.	11.
11.	11.	10.	10.	10.	9.	9.	9.	9.	8.
8.	8.	[illegible]	7.	7.	7.	7.	7.	6.	6.
6.	6.	5.	6.	6.	6.	7.	7.	7.	7.
7.	6.	8.	8.	9.	9.	9.	9.	10.	10.
10.	10.	11.	11.	11.	11.	12.	12.	12.	12.
12.	13.	13.	14.	16.	18.	21.	25.	30.	37.
45.	54.	65.	77.	90.	106.	123.	143.	165.	188.
210.	241.	278.	308.	335.	362.	388.	412.	437.	460.
483.	504.	526.	546.	566.	584.	601.	619.	639.	662.
691.	732.	781.	833.	897.	970.	1055.	1149.	1254.	1370.
1512.	1659.	1807.	1973.	2142.	2327.	2530.	2745.	2991.	3282.
3602.	3954.	4319.	4696.	5101.	5514.	5925.	6337.	6730.	7115.
7468.	7847.	8175.	8477.	8745.	8966.	9153.	9308.	9443.	12616.
9879.	8911.	10436.	9141.	10097.	9279.	9709.	9191.	9276.	8931.
8821.	8589.	8320.	8207.	7945.	7779.	7487.	7351.	7069.	6931.
6663.	6527.	6224.	6152.	5926.	5799.	5594.	5470.	5286.	5169.
5003.	4890.	4747.	4638.	4506.	4398.	4277.	4173.	4063.	3961.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	2.	2.	2.	2.	3.	3.
3.	3.	4.	4.	4.	5.	5.	5.	5.	6.
6.	6.	6.	7.	7.	7.	7.	7.	7.	9.
7.	7.	[illegible]	7.	7.	7.	7.	7.	7.	7.
7.	7.	6.	6.	6.	6.	6.	6.	6.	6.
5.	5.	5.	5.	5.	5.	5.	5.	4.	4.

4.	4.	4.	4.	4.	4.	4.	4.	3.	3.

STAGE

1673.1	1673.1	1673.1	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2
1673.2	1673.2	1673.2	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.2	1673.2	1673.2	1673.2	1673.2
1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2
1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.2
1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.3	1673.3	1673.4	1673.5
1673.5	1673.7	1673.8	1673.9	1674.1	1674.2	1674.3	1674.4	1674.6	1674.7
1674.8	1675.0	1675.2	1675.3	1675.4	1675.6	1675.7	1675.7	1675.8	1675.9
1676.0	1676.1	1676.2	1676.3	1676.3	1676.4	1676.5	1676.5	1676.6	1676.7
1676.7	1676.9	1677.0	1677.2	1677.4	1677.6	1677.8	1678.0	1678.3	1678.6
1678.9	1679.2	1679.4	1679.7	1680.0	1680.2	1680.4	1680.7	1680.9	1681.2
1681.3	1681.5	1681.7	1681.9	1682.2	1682.3	1682.5	1682.7	1682.8	1683.0
1683.1	1683.3	1683.4	1683.5	1683.6	1683.6	1683.7	1683.7	1683.8	1684.8
1683.9	1683.6	1684.1	1683.7	1684.0	1683.7	1683.9	1683.7	1683.7	1683.6
1683.6	1683.5	1683.5	1683.4	1683.3	1683.2	1683.1	1683.1	1683.0	1682.9
1682.8	1682.7	1682.6	1682.6	1682.5	1682.5	1682.4	1682.3	1682.3	1682.2
1682.1	1682.0	1682.0	1681.9	1681.8	1681.8	1681.7	1681.6	1681.6	1681.5

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	12616.	8422.	3207.	1543.	462986.
CMS	357.	238.	91.	44.	13110.
INCHES		2.05	3.12	3.12	3.12
MM		51.96	79.14	79.34	79.34
AC-FT		4176.	6361.	6377.	6377.
THOUS CU M		5151.	7846.	7866.	7866.

MAXIMUM STORAGE = 9.

MAXIMUM STAGE IS 1684.8

STATION 98, PLAN 2, RTIO 1

OUTFLOW

5.	8.	11.	13.	14.	14.	14.	14.	14.	14.

13.	13.	12.	12.	11.	11.	11.	10.	10.	9.
[illegible]	8.	[illegible]	6.	7.	7.	7.	7.	6.	6.
6.	6.	5.	5.	5.	5.	5.	4.	4.	4.
4.	4.	4.	4.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	3.
3.	3.	3.	3.	3.	3.	4.	4.	4.	4.
5.	5.	5.	6.	6.	7.	7.	8.	8.	9.
9.	10.	11.	12.	12.	13.	13.	14.	14.	15.
15.	15.	16.	16.	16.	16.	16.	15.	15.	15.
15.	14.	14.	14.	13.	13.	13.	12.	12.	11.
11.	11.	10.	10.	10.	9.	9.	9.	9.	8.
8.	8.	8.	7.	7.	7.	7.	7.	6.	6.
6.	6.	6.	6.	6.	6.	7.	7.	7.	7.
7.	8.	8.	8.	9.	9.	9.	9.	10.	10.
10.	10.	11.	11.	11.	11.	12.	12.	12.	12.
12.	13.	13.	14.	16.	18.	21.	25.	30.	37.
45.	54.	65.	77.	90.	106.	123.	143.	165.	188.
[illegible]	241.	276.	308.	335.	362.	388.	412.	437.	460.
463.	504.	526.	546.	566.	584.	601.	619.	639.	662.
691.	732.	781.	833.	897.	970.	1055.	1149.	1254.	1370.
1512.	1659.	1807.	1973.	2142.	2327.	2530.	2745.	2991.	3282.
3602.	3954.	4319.	4696.	5101.	5514.	5925.	6337.	6730.	7115.
7486.	7647.	8175.	8477.	8745.	8966.	9153.	9308.	9443.	12746.
[illegible]	9123.	9634.	9869.	9503.	9727.	9382.	9424.	9116.	9034.
8760.	8617.	8376.	8194.	7969.	7748.	7523.	7313.	7107.	6894.
6695.	6494.	6315.	6124.	5952.	5775.	5615.	5450.	5303.	5155.
5015.	4680.	4756.	4631.	4512.	4394.	4281.	4170.	4065.	3959.

STUR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

[illegible]	0.	0.	0.	0.	0.	0.	0.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	2.	2.	2.	2.	3.	3.
3.	3.	4.	4.	4.	5.	5.	5.	5.	6.
6.	6.	6.	7.	7.	7.	7.	7.	7.	9.
9.	7.	7.	7.	7.	7.	7.	7.	7.	7.
7.	7.	6.	6.	6.	6.	6.	6.	6.	6.
5.	5.	5.	5.	5.	5.	5.	5.	5.	4.
4.	4.	4.	4.	4.	4.	4.	4.	3.	3.

STAGE

1673.1	1673.1	1673.1	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2
1673.2	1673.2	1673.2	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.2	1673.2	1673.2	1673.2	1673.2
1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2
1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.2
1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.3	1673.3	1673.4	1673.5
1673.5	1673.7	1673.8	1673.9	1674.1	1674.2	1674.3	1674.4	1674.6	1674.7
1674.8	1675.0	1675.2	1675.3	1675.4	1675.6	1675.7	1675.7	1675.8	1675.9
1676.0	1676.1	1676.2	1676.3	1676.3	1676.4	1676.5	1676.5	1676.6	1676.7
1676.7	1676.9	1677.0	1677.2	1677.4	1677.6	1677.8	1678.0	1678.3	1678.6
1678.9	1679.2	1679.4	1679.7	1680.0	1680.2	1680.4	1680.7	1680.9	1681.2
1681.3	1681.5	1681.7	1681.9	1682.2	1682.3	1682.5	1682.7	1682.8	1683.0
1683.1	1683.3	1683.4	1683.5	1683.6	1683.6	1683.7	1683.7	1683.8	1684.8
1684.9	1683.7	1683.9	1683.9	1683.8	1683.9	1683.8	1683.8	1683.7	1683.7
1683.6	1683.5	1683.5	1683.4	1683.3	1683.2	1683.1	1683.0	1683.0	1682.9
1682.8	1682.7	1682.7	1682.6	1682.5	1682.4	1682.4	1682.3	1682.3	1682.2
1682.1	1682.[illegible]	1682.0	1681.9	1681.8	1681.8	1681.7	1681.6	1681.6	1681.5

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	13202.	8513.	3230.	1554.	466259.
CMS	374.	241.	91.	44.	13203.
INCHES		2.07	3.14	3.15	3.15
MM		52.52	79.70	79.90	79.90
AC-FT		4221.	6406.	6422.	6422.
THOUS CU M		5207.	7902.	7922.	7922.

MAXIMUM STORAGE = 9.

MAXIMUM STAGE IS 1064.9

STATION 98, PLAN 3, RTIO 1

OUTFLOW

5.	6.	11.	13.	14.	14.	14.	14.	14.	14.
13.	13.	12.	12.	11.	11.	11.	10.	10.	9.
9.	8.	8.	8.	7.	7.	7.	7.	6.	6.
6.	6.	5.	5.	5.	5.	5.	4.	4.	4.
4.	4.	4.	4.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	3.
3.	3.	3.	3.	3.	3.	4.	4.	4.	4.
5.	5.	5.	6.	6.	7.	7.	8.	8.	9.
9.	10.	11.	12.	12.	13.	13.	14.	14.	15.
15.	15.	16.	16.	16.	16.	16.	15.	15.	15.
15.	14.	14.	14.	13.	13.	13.	12.	12.	11.
11.	11.	10.	10.	10.	9.	9.	9.	9.	8.
8.	8.	6.	7.	7.	7.	7.	7.	6.	6.
6.	6.	6.	6.	6.	6.	7.	7.	7.	7.
7.	8.	8.	8.	9.	9.	9.	9.	10.	10.
10.	10.	11.	11.	11.	11.	12.	12.	12.	12.
12.	13.	13.	14.	16.	18.	21.	25.	30.	37.
45.	54.	65.	77.	90.	106.	123.	143.	165.	188.
210.	241.	278.	308.	335.	362.	388.	412.	437.	460.
483.	504.	526.	546.	566.	584.	601.	619.	639.	662.
691.	732.	781.	833.	897.	970.	1055.	1149.	1254.	1370.
1512.	1659.	[illegible]	1973.	2142.	2327.	2530.	2745.	2991.	3282.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7483.	7847.	8175.	8477.	8745.	8966.	9153.	9308.	9443.	11205.
12373.	12876.	10486.	9220.	10015.	9337.	9673.	9211.	9269.	8929.
8830.	8575.	8397.	8169.	7963.	7761.	7505.	7334.	7084.	6917.
6676.	6516.	6294.	6143.	5935.	5792.	5600.	5464.	5291.	5165.
5007.	4887.	[illegible]	4636.	[illegible]	4397.	4278.	4172.	4064.	3961.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	2.	2.	2.	2.	3.	3.
3.	3.	4.	4.	4.	5.	5.	5.	5.	6.
6.	6.	6.	7.	7.	7.	7.	7.	7.	8.
9.	9.	8.	7.	7.	7.	7.	7.	7.	7.
7.	7.	6.	6.	6.	6.	6.	6.	6.	6.
5.	5.	5.	5.	5.	5.	5.	5.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	3.	3.

				STAGE					
1673.1	1673.1	1673.1	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2
1673.2	1673.2	1673.2	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0
1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.0	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.2	1673.2	1673.2	1673.2	1673.2
1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2
1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1
1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.1	1673.2
1673.2	1673.2	1673.2	1673.2	1673.2	1673.2	1673.3	1673.3	1673.4	1673.5
1673.5	1673.7	1673.8	1673.9	1674.1	1674.2	1674.3	1674.4	1674.6	1674.7
1674.8	1675.0	1675.2	1675.3	1675.4	1675.6	1675.7	1675.7	1675.8	1675.9
1676.0	1676.1	1676.2	1676.3	1676.3	1676.4	1676.5	1676.5	1676.6	1676.7
1676.7	1676.9	1677.0	1677.2	1677.4	1677.6	1677.8	1678.0	1678.3	1678.6
1678.9	1679.2	1679.4	1679.7	1680.0	1680.2	1680.4	1680.7	1680.9	1681.2
1681.3	1681.5	1681.7	1681.9	1682.2	1682.3	1682.5	1682.7	1682.8	1683.0
1683.1	1683.3	1683.4	1683.5	1683.6	1683.6	1683.7	1683.7	1683.6	1684.3
1684.7	1684.8	1684.1	1683.7	1684.0	1683.8	1683.9	1683.7	1683.7	1683.6
1683.6	1683.5	1683.5	1683.4	1683.3	1683.2	1683.1	1683.1	1683.0	1682.9
1682.8	1682.7	1682.6	1682.6	1682.5	1682.5	1682.4	1682.3	1682.3	1682.2
1682.1	1682.0	1682.0	1681.9	1681.8	1681.8	1681.7	1681.6	1681.6	1681.5

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	12876.	8565.	3243.	1560.	468120.
CMS	365.	243.	92.	44.	13256.
INCHES		2.08	3.15	3.16	3.16
MM		52.84	80.02	80.22	80.22
AC-FT		4247.	6432.	6446.	6448.
THOUS CU M		5236.	7933.	7953.	7953.

MAXIMUM STORAGE = 9.

MAXIMUM STAGE IS 1684.8

********** ********** ********** ********** **********

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

RATIOS APPLIED TO FLOWS

OPERATION	STATION	AREA	PLAN	RATIO 1 0.50
HYDROGRAPH AT	100	14.00	1	7042.
		(36.26)		(199.41)(
			2	7042.
				(199.41)(
			3	7042.
				(199.41)(
ROUTED TO	301	14.00	1	7021.
		(36.26)		(198.82)(
			2	7021.
				(198.82)(
			3	7021.
				(198.82)(
HYDROGRAPH AT	200	20.60	1	14809.
		(53.35)		(419.35)(
			2	14809.
				(419.35)(
			3	14809.
				(419.35)(
ROUTED TO	200	20.60	1	1374.
		(53.35)		(38.91)(
			2	1374.
				(38.91)(
			3	1374.
				(38.91)(
ROUTED TO	302	20.60	1	1373.
		(53.35)		(38.87)(
			2	1373.
				(38.87)(
			3	1373.
				(38.87)(
HYDROGRAPH AT	300	3.70	1	2580.
		(9.58)		(73.06)(

```
                                       2      2580.
                                        (   (73.06)(
                                       3      2560.
                                        (    73.06)(

 3 COMBINED       30?     38.30        1      9721.
                      (   99.20)        (  275.26)(
                                       2      9721.
                                        (  275.26)(
                                       3      9721.
                                        (  275.26)(

ROUTED TO         100     38.30        1     13149.
                      (   99.20)        (  372.34)(
                                       2     13300.
                                        (  376.61)(
                                       3     13091.
                                        (  370.69)(

ROUTED TO          99     38.30        1     12860.
                      (   99.20)        (  364.15)(
                                       2     12999.
                                        (  368.08)(
                                       3     12962.
                                        (  367.05)(

ROUTED TO          98     38.30        1     12616.
                      (   99.20)        (  357.25)(
                                       2     13202.
                                        (  373.84)(
                                       3     12878.
                                        (  364.67)(


                                                   PLAN  1       STATION    301

                                                          MAXIMUM       MAXIMUM      TIME
                                               RATIO     FLOW,CFS      STAGE,FT     HOURS
                                                0.50        7021.        1737.2     44.00

                                                   PLAN  2       STATION    301

                                                          MAXIMUM       MAXIMUM      TIME
                                               RATIO     FLOW,CFS      STAGE,FT     HOURS
                                                0.50        7021.        1737.2     44.00

                                                   PLAN  3       STATION    301
```

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	7021.	1737.2	44.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1858.00	1858.00	1861.00
STORAGE	0.	0.	6707.
OUTFLOW	0.	0.	1332.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1861.04	0.04	6808.	1374.	2.50	49.50	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1858.00	1858.00	1861.00
STORAGE	0.	0.	6707.
OUTFLOW	0.	0.	1332.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1861.04	0.04	6808.	1374.	2.50	49.50	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1858.00	1858.00	1861.00
STORAGE	0.	0.	6707.
OUTFLOW	0.	0.	1332.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1861.04	0.04	6808.	1374.	2.50	49.50	0.00

PLAN 1 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	1373.	1765.4	50.00

PLAN 2 STATION 302

MAXIMUM MAXIMUM TIME

RATIO	FLOW,CFS	STAGE,FT	HOURS
0.50	1373.	1785.4	50.00

PLAN 3 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	1373.	1785.4	50.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1706.00	1706.00	1710.00
STORAGE	70.	70.	102.
OUTFLOW	0.	0.	2212.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1714.80	4.80	147.	21328.	4.58	43.27	43.17

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1706.00	1706.00	1710.00
STORAGE	70.	70.	102.
OUTFLOW	0.	0.	2212.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1714.60	4.60	147.	15003.	4.16	43.46	43.17

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1706.00	1706.00	1710.00
STORAGE	70.	70.	102.
OUTFLOW	0.	0.	2212.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1714.[illegible]	4.[illegible]0	147.	15091.	4.27	43.67	43.17

PLAN 1 STATION 99

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	12660.	1701.5	43.33

PLAN 2 STATION 99

MAXIMUM MAXIMUM TIME

RATIO	FLOW,CFS	STAGE,FT	HOURS
0.50	12999.	1701.6	43.33

PLAN 3 STATION 99

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	12962.	1701.6	43.67

PLAN 1 STATION 98

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	12616.	1684.8	43.33

PLAN 2 STATION 98

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	13202.	1684.9	43.50

PLAN 3 STATION 98

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	12878.	1684.8	43.67

APPENDIX D

STABILITY ANALYSIS

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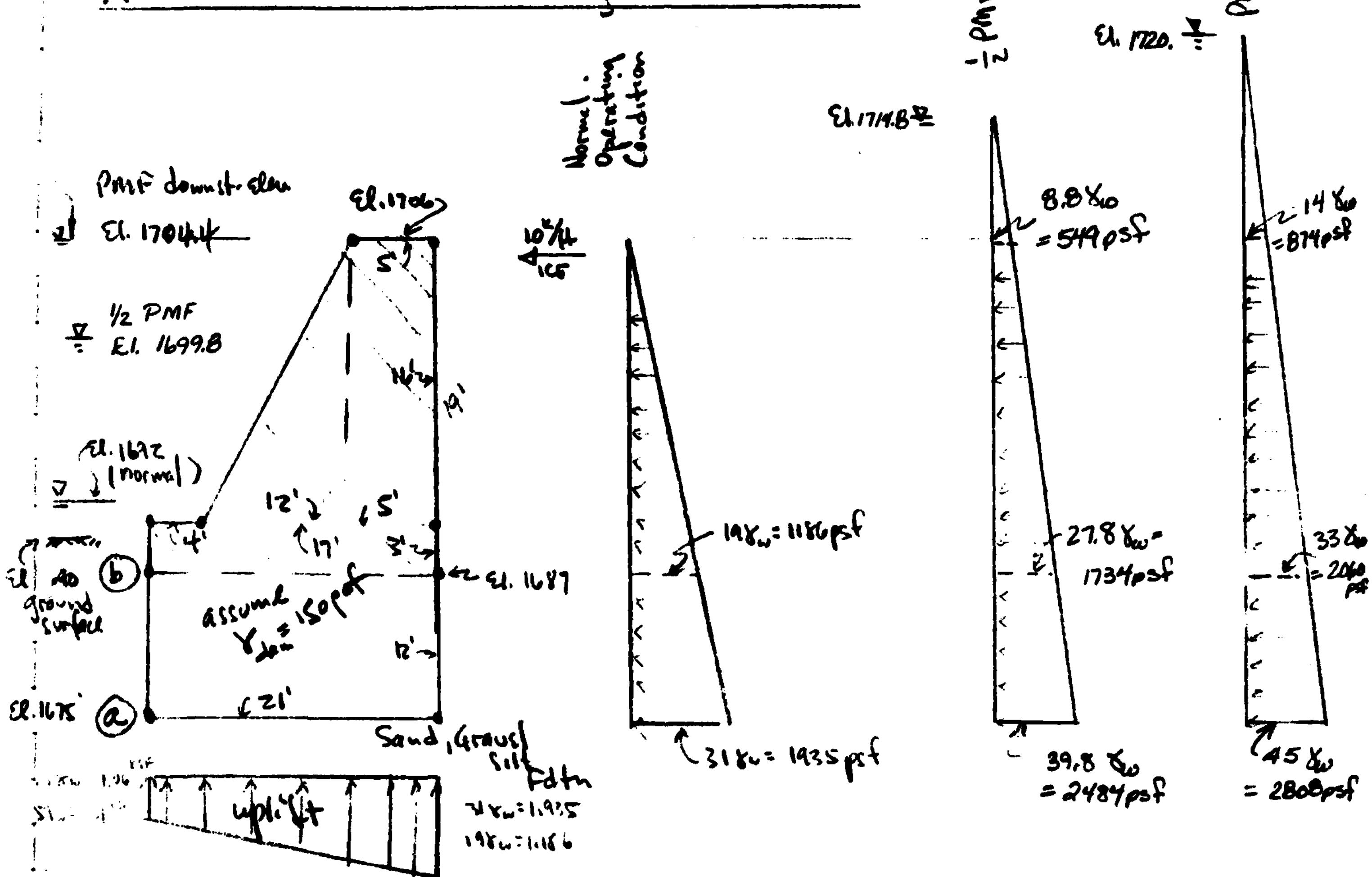
1/10

PROJECT NAME LAKE PLACID VILLAGE DAM DATE 5/16/80

SUBJECT STABILITY ANALYSIS PROJECT NO.

DRAWN BY DFM

Assumed Section and Loading Conditions



Resisting moment @ point (b) due to mass of original dam section only =

$$= (.150)\left[\left(3\times21\times\frac{21}{2}\right)+\left(\frac{1}{2}\times16\times12\right)(8+4)+(5\times16)(18.5)\right] = 494^{\text{lK}}$$

Resisting moment @ point (a) due to mass of original plus new foundation section =

$$= 494^{\text{lK}} + (.15)\left(12\times21\times\frac{21}{2}\right) = 891^{\text{lK}}$$

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PROJECT NAME L.P. DATE
SUBJECT PROJECT NO.
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Case I · WL @ Spillway Elevation

condition (1), assume original dam and new foundation is integral unit

condition (2), assume original dam section and foundation not bonded, analyze forces on original dam only

(a overturning, condition (1)

use $k_a = 0.4$

M_o causing overturning due to horiz. water pressure, uplift, ice, earth pressure

$= \left(1935^{KSF} \times 31' \times \frac{1}{2} \times \frac{31}{3}\right) + \left[\left(1.06 \times 21 \times \frac{21}{2}\right) + \left(.875 \times \frac{21}{2} \times \frac{42}{3}\right)\right] + (10 \times 30) + (.4)\left(.96 \times 15 \times \frac{15}{2} \ldots\right)$

$= 310^{k} + (234 + 128)^{k} + 300^{k} + 14^{k} = 986^{k}$

use $k_p = 3$

M_R resisting overturning due to mass of dam, passive earth pressure D/S, water

$= 891^{k} + (3)\left(0.06 \times 15 \times \frac{15}{2} \times \frac{15}{3}\right) + \left(.0624 \times 17 \times \frac{17}{2} \times \frac{17}{3}\right) = 1043^{k}$

FS against overturning $= \frac{1043}{686} = \underline{1.52}$ (no ice)

FS against overturning $= \frac{1043}{986}{}^{k} = \underline{1.06}$ (with ice) (low)

Position of Resultant, R : $d = \frac{\Sigma M_{toe}}{\Sigma V}$

where ΣV = wt. dam − uplift $= (.150)\left[(3 \times 21) + \left(\frac{16 \times 12}{2}\right) + (5 \times 16) + (\ldots)\right] - \left[\frac{1.06 + 1.935}{2}\right] \ldots$

$= 73.6^{k} - 31.4^{k} = 42.2^{k} = N$

$d = \left(\frac{1043 - 686}{42.2}\right) = 8.46' = 8.46/21 (b) = .40b$ (no ice)

$d = \frac{(1043 - 986)^{k}}{42.2^{k}} = \underline{1.4}'$ (outside mid-third) (with ice) (N.G.)

$d = .07b$

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(b) Sliding condition (1)

$$FS = \frac{\mu N + \text{Passive Pressure Downstream} + H_2O \text{ Downstream}}{H_2O \text{ upstream} + \text{Ice} + \text{Lat. Soil Pressure upstream}}$$

$$= \frac{(0.6 \times 42.2) + (3)(.060 \times 15 \times \frac{15}{2}) + (.0624 \times 17 \times \frac{17}{2})}{(1.935 \times \frac{21}{2}) + 10 + (.060 \times 15 \times \frac{15}{2} \times .4)} = \frac{54.5}{42.7} = \underline{1.3}$$ (low ok) [with ice]

$$\underline{FS} = \frac{54.5}{32.7} = \underline{1.67}$$ [no ice]

(c) Overturning condition (2)

M_b causing overturning due to horiz. water pressure, ice, uplift (neglect soil pressure upst and dst, small)

$$= (1.186 \times \frac{19}{2} \times \frac{19}{3}) + (10^k \times 18') + \left[(0.31 \times 21 \times \frac{21}{2}) + (1.186 - 0.31)(\frac{21}{2})(\frac{42}{3})\right] =$$

$$= 71.4 + 180 + 197.2 = 448.6^{\,1k}$$

M_b resisting overturning due to mass of dam, dnstream water, neglect tensile bond at base of section

$$= 494^{1k} + (0.31 \times \frac{5}{2} \times \frac{5}{3}) = 495.3^{1k}$$

$\underline{FS}$ against overturning $= 495.3/(448.6 - 180) = \frac{495.3}{268.6} = \underline{1.84}$ [no ice]

$\underline{FS}$ against overturning $= \frac{495.3^{1k}}{448.6^{1k}} = \underline{1.10}$ (ok, low) [with ice]

Position of Resultant, R: $d = \frac{\Sigma M_{toe}}{\Sigma V}$ from toe

where ΣV = wt. dam − uplift $= (45)(.39) - (\frac{0.31 + 1.186}{2})(21) = 20.2^k = N$

$\underline{d} = \frac{(495.3 - 268.6)}{20.2} = 11.2'$ $= 0.53b$ [no ice]

$$\underline{d} = \frac{(495.3 - 448.6)^k}{20.2^k} = \underline{2.3}' \text{ from toe}$$ (outside mid-third) $= .11b$ [with ice]

4/10

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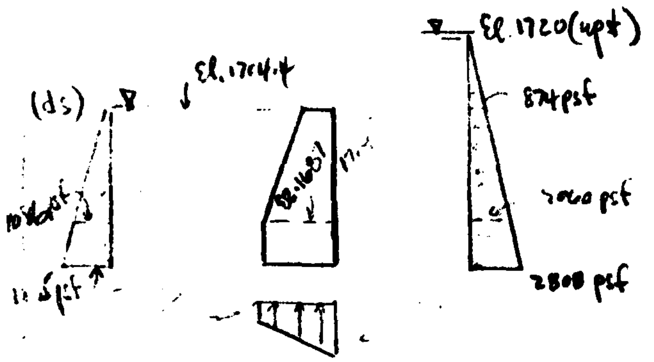
(d) Sliding, condition (2)

assumed no bond/shear

$$FS = \frac{\mu N + \text{downst. water pressure}}{\text{Upstream Water Pressure + ice}} = \frac{(0.65 \times 20.2) + (0.31 \times \frac{5}{2})}{(1.186 \times \frac{19}{2}) + 10} = \underline{0.65} \text{ (with ice)}$$

$$\underline{FS} = \frac{13.9}{11.3} = \underline{1.24} \text{ (no ice)}$$

Case II. WL @ PMF Elevation



e) Overturning, condition (1)

M_a causing overturning due to horiz. water pressure, uplift, lat. earth pressure

$$= \left[(.874 \times 31^2/2) + (2.808 - .874)\left(\frac{31}{2} \times \frac{31}{3}\right)\right] + \left[(1.835 \times 21 \times \frac{21}{2}) + (2.808 - 1.835)\left(\frac{21}{2} \times \frac{42}{3}\right)\right] + 14^k =$$

$$= (420 + 310) + (404 + 143) + 14 = 1292^k$$

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SUBJECT PROJECT NO.

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M_R resisting overturning due to mass of dam, passive earth press., lateral D/S water

$$= 891^{1k} + 101 + \left(1.835 \times \frac{29.4}{2} \times \frac{29.4}{3}\right) = 1256^{1k}$$

(D/S H_2O term: 264)

$\underline{FS}$ against overturning $= \dfrac{1256^{1k}}{1292^{1k}} = \underline{\underline{0.97}}$ (ok)

Position of Resultant, R : outside of base because F.S. < 1.0

$$N = \text{wt. dam} - \text{uplift} = 73.6^k - \left(\frac{2.608 + 1.835}{2}\right)(21) = 24.8^k$$

(uplift: 48.8)

) Sliding, condition (1)

$$\underline{FS} = \frac{\mu N + \text{Passive Pressure Downst.} + H_2O \text{ Downstream}}{H_2O \text{ upstream} + \text{Lat. Soil Press upstream}}$$

$$= \frac{(0.6 \times 24.8) + (20.2) + \left(1.835 \times \frac{29.4}{2}\right)}{\left(\frac{.874 + 2.808}{2}\right)(31) + 2.7} = \frac{62}{59.8} = \underline{\underline{1.04}} \quad (\text{low})$$

(intermediate values written above/below terms: 14.9, 27, 57)

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(g) Overturning, condition (2)

M_o causing overturning due to horiz. water pressure, uplift (neglect soil pressure, small)

$$= \left[\left(.874 \times 19 \times \tfrac{19}{2}\right) + (2.06 - .874)\left(\tfrac{19}{2} \times \tfrac{19}{3}\right)\right] + \left[\left(1.086 \times 21 \times \tfrac{21}{2}\right) + (2.06 - 1.086)\left(\tfrac{21}{2} \times \tfrac{42}{3}\right)\right] = 612^{1k}$$

(lat. H_2O: 157.6, 71.4; uplift: 239.5, 143.2)

M_o resisting overturning due to mass of dam, dnstream water, neglect tensile load at base of section

$$= 494^{1k} + \left(1.086 \times \tfrac{17.4}{2} \times \tfrac{17.4}{3}\right) = 549^{1k}$$

$$\underline{FS} = \frac{549^{1k}}{612^{1k}} = \underline{\underline{0.90}} \quad \text{(unsafe)}$$

Position of Resultant, R : $d = \dfrac{\Sigma M_{toe}}{\Sigma V}$

where V = wt. dam − uplift = $36^k - \left(\frac{2.06 + 1.086}{2}\right)(21) = 3^k = N$

$$\underline{d} = \left(\frac{549 - 612}{3}\right) = -\underline{21}' \quad \text{(fictitious)}$$

h) Sliding, condition (2)

assume no bond/shear at base of section

$$\underline{FS} = \frac{\mu N + \text{downst. } H_2O \text{ pressure}}{\text{upstream } H_2O \text{ pressure}}$$

$$= \frac{(0.65 \times 3) + \left(1.086 \times \frac{17.4}{2}\right)}{\left(\frac{.874 + 2.06}{2}\right)(19)} = \frac{11.3}{27.9} = \underline{0.41} \quad \text{(unsafe)}$$

(1.95, 9.5; 27.9)

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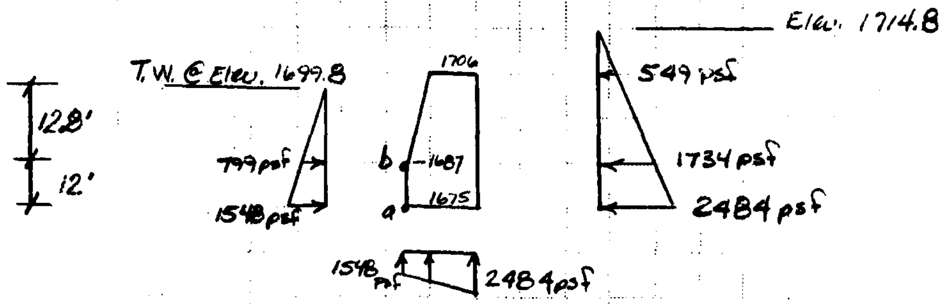
Case III @ 1/2 PMF Conditions



i) Overturning, Condition (1)

M_a causing overturning due to horiz. water pressure, uplift, lat. soil pressure.

$$= \left[\overset{\text{lat. } H_2O}{0.549k \times \frac{(31')^2}{2} + 310^{1\text{-}k}}\right] + \left[\overset{\text{uplift}}{1.548\,\frac{(21')^2}{2} + (2.484-1.548)\left(\frac{21'}{2} + \tfrac{2}{3} \times 21'\right)}\right] + \overset{\text{Soil}}{14^{1\text{-}k}}$$

$$= 264 + 310 + 341 + 138 + 14 = 1067^{1\text{-}k}$$

M_a resisting overturning due to mass of dam, d/s water press, lateral soil press (K_p).

$$= \overset{\text{dam}}{\Sigma 891^{1\text{-}k}} + \left[\overset{d/s\ H_2O}{(1.548)\,\frac{(24.8')^2}{2 \times 3}}\right] + \overset{K_p}{101^{1\text{-}k}} = 891 + 159 + 101 = 1151^{1\text{-}k}$$

F.S. against overturning $= \frac{1151}{1067} = 1.08$

Position of resultant

$$= \frac{\Sigma M}{\Sigma V} = \frac{1151 - 1067}{73.6 - \left(\frac{1.548 + 2.484}{2}\right)(21')} = \frac{84}{73.6 - 42.3} = 2.7' = 0.13\, b$$

j) Sliding (Condition 1)

$$F.S. = \frac{\mu N + K_p \text{ pressure} + T.W. \text{ press}}{H.W. \text{ press} + \text{lat soil press } u/s} = \frac{0.6(73.6 - 42.3) + \overset{K_p}{20.2} + \frac{24.8'}{2}(1.548)}{\left(\frac{.549 + 2.484}{2}\right)(31) + 2.7} = 1\ldots$$

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k) Overturning, condition (2)

M_b causing overturning due to horiz. water press & uplift

$$\left[0.549\frac{(19')^2}{2} + (1.734-.549)\frac{(19')^2}{6}\right] + \left[0.799\frac{(21')^2}{2} + (1.734-0.8)\frac{(21')^2}{3}\right]$$

$$= (99 + 71.3) + (176 + 137) = 484^{k\text{-}k}$$

M_b resisting overturning due to mass of dam, d/s water

$$= \overset{dam}{494^{k\text{-}k}} + \tfrac{1}{2}(12.8')(.799)\left(\frac{12.8'}{3}\right) = 494 + 22 = 516^{k\text{-}k}$$

$$F.S.\text{ against overturning} = \frac{516}{484} = 1.07$$

Position of Resultant

$$d = \frac{516-484}{35.9-\left(\frac{.799+1.734}{2}\right)(21')} = \frac{32}{9.3} = 3.4' = 0.16\,b$$

l) Sliding, cond. 2

$$F.S. = \frac{\mu N + T.W.\ press.}{H.W.\ press.} = \frac{0.65(9.3^k) + \left(\frac{0.799}{2}\right)(12.8)}{\left(\frac{.549+1.734}{2}\right)(19')}$$

$$= \frac{6.0 + 5.1}{21.7} = 0.50$$

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Case IV · WL @ Spillway Elevation Plus Seismic Effects, No Ice

(m) Overturning about ⓐ

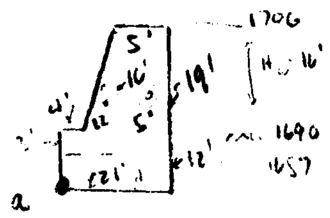
Ref. Case I, M_a causing (exclude ice) = 686^{1k}

M_a resisting (excluding seismic) = 1043^{1k}

(i) Additional M_a due to seismic effects, applying coeff for Zone 3 to W

use factor = 0.1 W for horizontal (neglect effect on k_a)

= 0.05 W for vertical



$$M_a = \left(\tfrac{1}{2}\times 12\times16\times.15\right)(.1)\left(\tfrac{16}{3}+15\right) + \left(\tfrac{1}{2}\times12\times16\times.15\right)(.05)(8+4) +$$

$$+ (16\times5\times.15)(.1)\left(\tfrac{16}{2}+15\right) + (16\times5\times.15)(.05)\left(16+\tfrac{5}{2}\right) +$$

$$+ (3\times21\times.15)(.1)\left(12+\tfrac{3}{2}\right) + (3\times21\times.15)(.05)\left(\tfrac{21}{2}\right) +$$

$$+ (12\times21\times.15)(.1)\left(\tfrac{12}{2}\right) + (12\times21\times.15)(.05)\left(\tfrac{21}{2}\right) =$$

$$= 29.2 + 8.6 + 27.6 + 11.1 + 12.8 + 5.0 + 22.7 + 19.8 = 136$$

(ii) Additional M_a due to inertial effect on reservoir water

$V_e = .8^k$

$$M_a = (0.73)(.73\times.10\times.0624\times16\times16)\left[15+(.41\times16)\right] = 18.4^{1k}$$

FS against overturning: $\dfrac{1043^{1k}}{(686+137+18)^{1k}} = \dfrac{1043}{841} = \underline{1.24}$

$\underline{d} = \dfrac{(1043-841)^{1k}}{42.2-.05(73.6)} = 5.2'\pm = \dfrac{5.2}{21}(b) = \underline{0.25\,b}$

(n) Sliding additional horiz. forces causing sliding due to horiz. acceleration of dam mass plus acceleration of water (neglect effect on k_a)

$= 0.1\,W + V_w = (0.1)(73.6) + 0.85 = 8.2^k$

FS against sliding $= \dfrac{.6(38.5)+29.2^k}{(32.7+8.2)^k} = \underline{1.28}$

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PROJECT NAME L.P.I DATE 5/22/80

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(a) Overturning about (b)

Ref. Case I, M_b causing (exclude ice) = 268.6^{1k}

M_b resisting = 495.3^{1k}

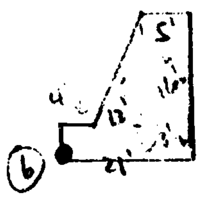
(iii) Additional M_b due to seismic effects, use 0.1 W for horizontal, 0.05 W vertical

$$M_b = (\tfrac{1}{2}\times12\times16\times.15)(.1)(3+\tfrac{16}{3}) + (\tfrac{1}{2}\times12\times16\times.15)(.05)(4+8) +$$

$$+(5\times16\times.15)(.1)(3+8) + (5\times16\times.15)(.05)(16+\tfrac{5}{2}) +$$

$$+ (3\times21\times.15)(.1)(\tfrac{3}{2}) + (3\times21\times.15)(.05)(\tfrac{21}{2}) =$$

$$= 12 + 8.6 + 13.2 + 11.1 + 1.4 + 5 = 51.3^{1k}$$



(iv) Additional M_b due to inertial effect on reservoir water

$$M_b = (0.85^k)(3' + 0.41\times16') = 8.1^k$$

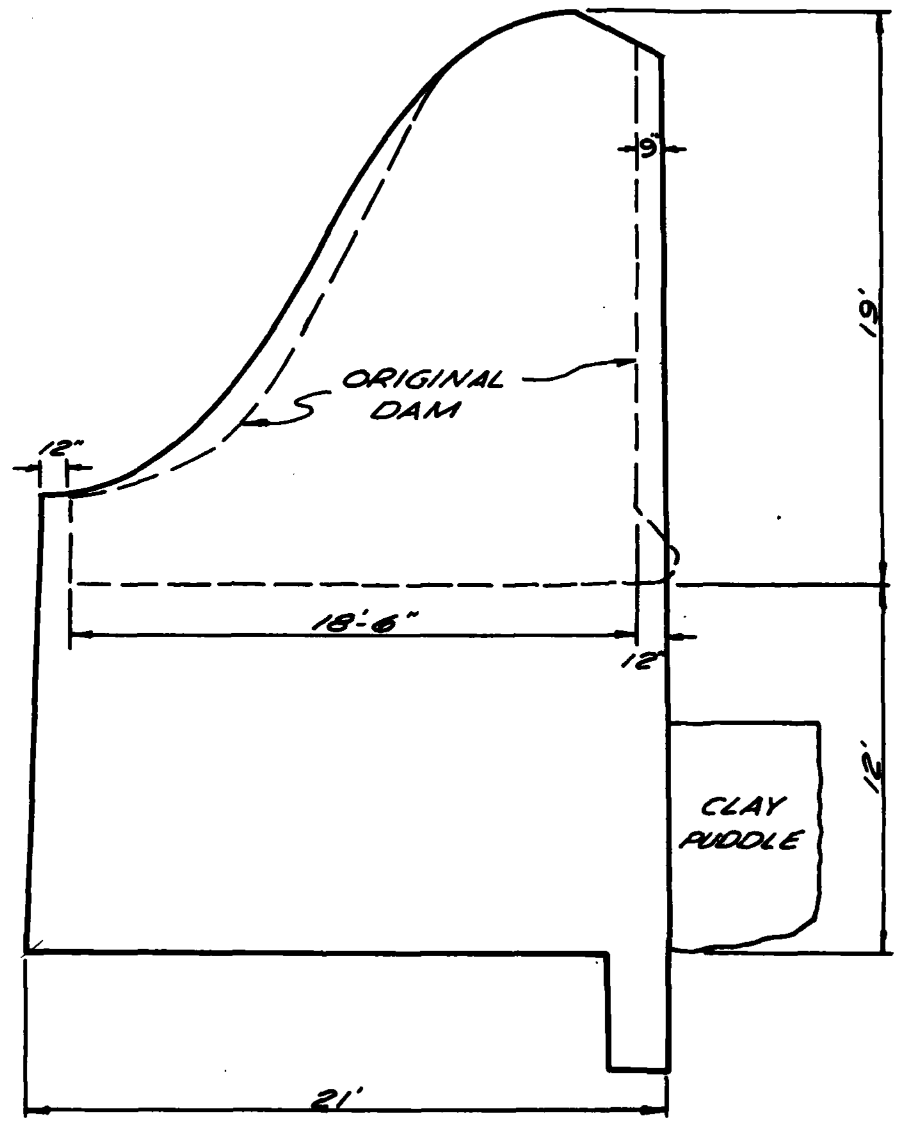
$$\underline{FS} \text{ against overturning} = \frac{495.3^{1k}}{(268.6+51.3+8.1)^{1k}} = \underline{1.5}$$

$$d = \frac{(495.3-328)^{1k}}{20.2-.05(35.9)} = 9.1 = \frac{9.1}{21}(b) = \underline{0.43b}$$

(b) Sliding additional horiz forces causing sliding due to acceleration of dam mass plus acceleration of water

$$= 0.1\,W + V_v = 0.1(35.9) + .85^k = 4.45^k$$

$$\underline{FS} \text{ against sliding} = \frac{(.65)(18.4)+.8}{(11.3+4.45^k)} = \underline{0.81} \quad \text{say } \underline{0.8\pm}$$



LAKE PLACID VILLAGE DAM

NO SCALE

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	JOB 2399	APP'D	

APPENDIX E

REFERENCES

APPENDIX

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